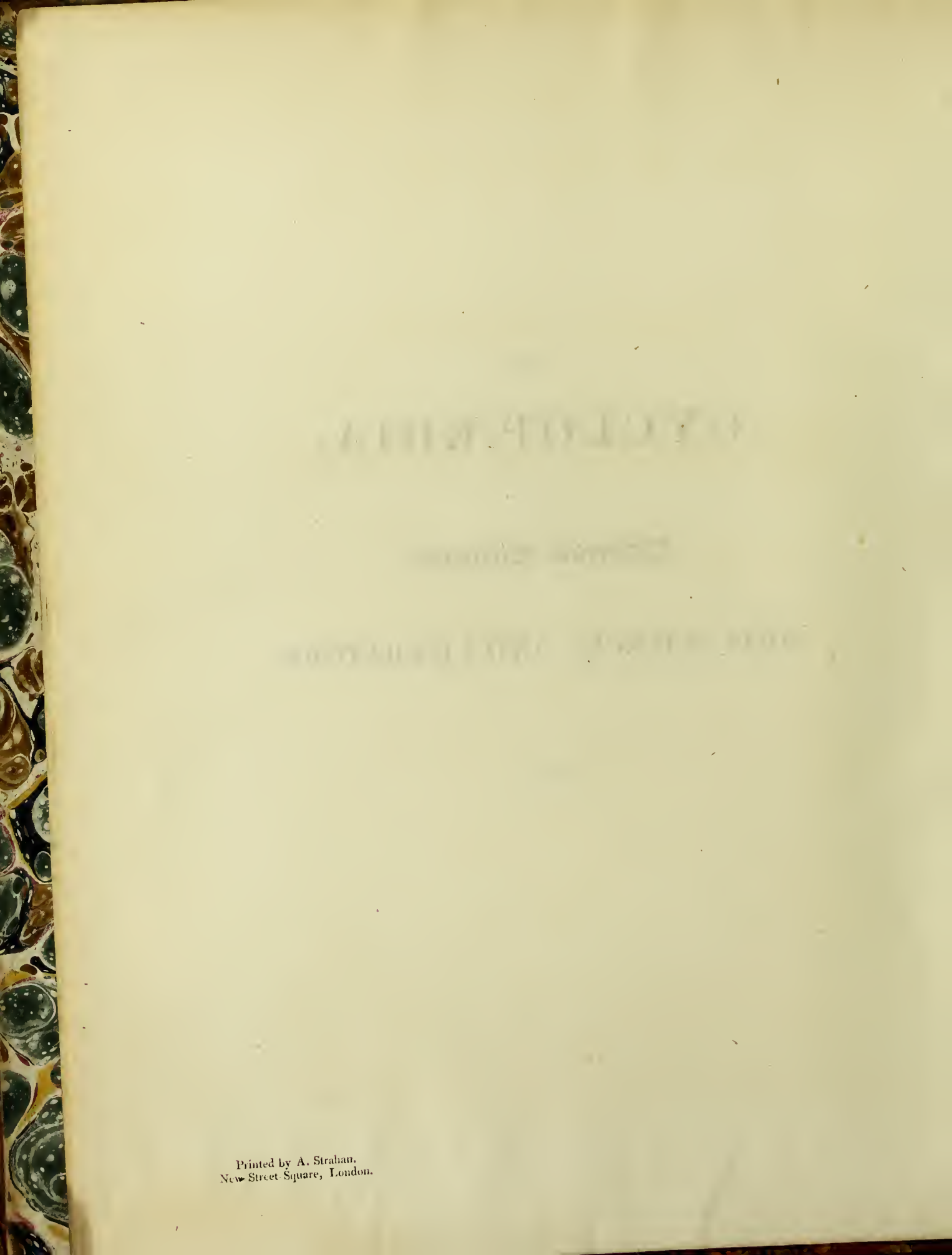




THE
CYCLOPÆDIA;
OR,
Universal Dictionary
OF
ARTS, SCIENCES, AND LITERATURE.

VOL. VI.



THE
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OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

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CYCLOPÆDIA:

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OF

ARTS and SCIENCES.

CALVARY.

CALVARY, or GOLGOTHA, in *Ancient Geography*, a mountain of Palestine, held in the greatest veneration as the scene of our Saviour's crucifixion. It acquired these two names, probably, from its roundness, or resemblance to a human skull, or, as others say, from its being bare and destitute of verdure. Theophylact says, that by a tradition descended from the fathers, Adam, (or as others say, Adam's head) was buried here, and therefore, says he, Christ, who was to heal the fall and death of Adam, was here crucified, that where the beginning of death was, there might be the dissolution of it. The witnesses of this tradition adduced by Theophylact are Origen, Tertullian, Epiphanius, Athanasius, and St. Augustin. St. Jerom observes, that this is a favourable interpretation, and pleasing to the ears of the people; but not true. It anciently stood without the walls of the city of Jerusalem, and was the place where criminals were executed according to the Mosaic law. But the Roman emperor Adrian having ordered the city to be re-built a little to the north of its former situation, Mount Calvary was enclosed within the walls. See *ÆLIA Capitolina*. This mountain was cleared by order of Helena, the mother of Constantine; and fitted for the foundation of a church by cutting down several parts of the rock and elevating others. But this was done with so much care, that no part of the hill which immediately related to our Saviour's passion was altered or diminished. Accordingly that part of Calvary, where it is said Christ was fastened to the cross, is left entire; being about 10 or 12 yards square. The magnificent church erected on this spot by order of Helena was, therefore, built in such a manner as to comprehend as many scenes of our Saviour's sufferings as could be conveniently enclosed. This stately edifice is still standing, and kept in good repair, by the offerings of the pil-

grims, who annually resort to it, as well as the contribution of several Christian princes. It is 100 paces long, and 60 wide; the walls of it are of stone, the roof of cedar; the east end encloses mount Calvary, and the west comprehends the holy sepulchre. The former is covered with a noble cupola, supported by 16 massive columns, which were encrusted with marble. The centre of it is open on the top just over the sepulchre; and above the high altar at the east end is another stately dome. The nave of the church constitutes the choir, and in the inside aisles are the places where the most remarkable circumstances of Christ's passion were transacted, together with the tombs of Godfrey and Baldwin, the two first Christian kings of Jerusalem. An ascent of 22 steps leads to a chapel, where that part of Calvary is shewn on which Christ was crucified, and the very hole in the rock, in which his cross was fixed. The altar hath three crosses in it, and is richly adorned with other costly embellishments, particularly with 46 silver lamps of immense value, that hang before it and are kept constantly burning. Adjoining to this is another small chapel, fronting the body of the church. At the west end is that of the sepulchre, which is hewn out of the solid rock, and has a small dome or lantern, supported by pillars of porphyry. The cloister round the sepulchre is divided into sundry chapels, appropriated to the several sects of Christians, who used to reside there, such as the Latins, Greeks, Syrians, Armenians, Abyssines, Georgians, Nestorians, Coptites, Maronites, &c. But these, says Maundrell, except four, viz. the Latins, Greeks, Armenians, and Coptites, have abandoned their quarters, not being able to sustain the severe rents and extortions, which their Turkish landlords impose upon them. The apartments of the Latins are on the north-west; to them belongs the care of the church, and

they make every day a solemn procession, with tapers and crucifixes, and other ceremonies, to the several sanctuaries of the church. Accordingly they are obliged to reside constantly in it; the Turks keeping the keys, and not suffering any of them to go out, but obliging them to receive their provisions through a wicket. Easter is the time at which the chief ceremonies are performed within this place; and these chiefly consist in representations of Christ's passion, crucifixion, death, and resurrection. At this solemnity, every pilgrim, paying a certain fee, is admitted to assist at the solemn procession and other ceremonies: of these there is commonly a vast concourse. Some of them choose to enter on Good-Friday, and stay till Easter-Monday.

CALVARY, a term used in catholic countries for a kind of chapel of devotion, raised on a hillock near a city; in memory of the place where Jesus Christ was crucified near Jerusalem. Such is the Calvary of St. Valerian, near Paris; which is accompanied with several little chapels, in each whereof is represented in sculpture one of the mysteries of the passion.

CALVARY, in *Heraldry*, a cross so called, because it resembles that on which our Saviour suffered: it is always set upon steps.

CALUBO ISLANDS, in *Geography*, lie to the S.E. of Borneo island in the East Indies; a little to the S. of E. from cape Salatan, and to the W. of S. from Laut island.

CALUCULA, in *Ancient Geography*, a small town of Spain, placed by Pliiny and Ptolemy in the department of Hispalis.

CALVELUZZO, in *Geography*, a town of Naples, in the province of Basilicata; 10 miles S. of Potenza.

CALVENSANO, a town of Italy, in the duchy of Milan, seated on the Adda.

CALVENTURAS, a small island in the bay of Bengal, near the coast of Ava. N. lat. $16^{\circ} 54'$. E. long. $95^{\circ} 20'$.

CALVERT, GEORGE, in *Biography*, baron of Baltimore, founder of the province of Maryland in North America, was the descendant of a noble family in Flanders, and born at Kipling in Yorkshire in 1582. After finishing his education at Oxford he became secretary to sir Robert Cecil, in the reign of James I. by whose favour he was made clerk of the privy-council, and received the honour of knighthood. In 1619 he was appointed one of the principal secretaries of state; but though he discharged the office with great fidelity and diligence, he resigned it in 1624, honestly confessing to the king that he was become a convert to the Roman Catholic religion. He was continued, however, a member of the privy-council during this reign, and in 1625 created baron of Baltimore in the kingdom of Ireland, at which time he represented the university of Oxford in parliament. Having been constituted by patent, during his secretaryship, proprietor of a province in Newfoundland, he named it "Avalon;" and expended upon it a large sum. But though he twice visited it in person, and rescued it from a French invasion, he at length abandoned it, and obtained from Charles I. a patent for the full property of the district since called Maryland. This he settled, and in his dealings with the natives displayed as much justice and good faith as William Penn did in his settlement of Pennsylvania. He likewise established a most liberal code of religious toleration in his province, so that it became not only the resort of a number of Roman Catholic gentlemen, who first accompanied the founder, but also an asylum for many quakers and others, who were persecuted by the bigotry of the puritans in New England. Lord Baltimore, who appears in all respects to have been a man of worth and sound understand-

ing, died at London in 1632. Biog. Brit. See MARYLAND.

CALVERT, in *Geography*, a county of Maryland, in the United States of America, on the western shore of the Chesapeake; about 33 miles long, and narrow.

CALVERT'S ISLAND, an island in the North Pacific ocean, near the west coast of North America. N. lat. $50^{\circ} 40'$. W. long. $128^{\circ} 10'$.

CALVI, a town of Naples, in the province of Lavora, the see of a bishop, suffragan of Capua; 5 miles N. of Capua, and not far from the sea. N. $41^{\circ} 15'$. E. long. $14^{\circ} 45'$.

CALVI, a town on the west side of the island of Corsica, the principal place of a district in the French department of Golo, containing 2135 inhabitants. It is situated on a promontory which advances into the sea, and forms one of the most beautiful harbours in the island, called "the gulf of Calvi." It is defended by a citadel on a rock with 5 bastions; distant about 11 leagues W.S.W. of Bastia. N. lat. $42^{\circ} 26'$. E. long. $9^{\circ} 7'$.

CALVIELLO, a town of Naples, in the province of Basilicata; 12 miles S.S.E. of Potenza.

CALVIN, JOHN, in *Biography*, an eminent reformer, entitled on account of his talents and character, as well as his peculiar activity and zeal, to the second rank of celebrity among those who contributed to rescue the Christian church from the errors and superstitions of Popery, was born of an obscure family, named Cauvin. at Noyon, in Picardy, in 1509. As he was originally designed for the church, he obtained at an early age a benefice in the cathedral church of his native place, and also the cure of Pont-l'Évêque. Having pursued the study of polite literature for some time at Paris, where he distinguished himself by his proficiency, and where he also acquired a predilection in favour of the new opinions in religion, from a study of the Scriptures, recommended to him by Robert Olivetan, he determined to change his professional destination; and applied to the study of the civil law, first at Orleans, and afterwards at Bourges. The Scriptures were likewise the objects of his particular attention; the more he acquainted himself with these purest sources of theological knowledge, the more was he confirmed in the opinions he had adopted; and his attachment to them was strengthened by intercourse with Melchior Wolmar, a German professor of the Greek language at Bourges. Upon his father's death he was obliged to return to Noyon, where he resigned his ecclesiastical benefices; and soon after removing to Paris, he published, in 1532, an eloquent Latin commentary on Seneca's treatise "De Clementia," on clemency. In the title of this book he latinized his name Cauvin into Calvinus, whence he afterwards assumed his common appellation of Calvin. His attachment to the reformation being now generally known, he was under a necessity of suddenly quitting Paris, and of retiring to Angoulême, where he obtained a subsistence by teaching Greek. Here he was admitted into the house of Lewis du Tillet, canon of the church, whom he had proselyted to the reformed religion; and during his residence in this place he wrote the greatest part of his "Institute." Notwithstanding some degree of protection which was afforded him by the queen of Navarre, he thought it most prudent to leave France, and in 1534 he withdrew to Basil, and in the following year published his celebrated work, entitled "Institutes of the Christian Religion." The design of this work was to exhibit a just view of the principles of the reformed, and to prevent their being confounded with the Anabaptists and other enthusiasts. It was addressed to Francis I. by a dedicatory epistle, which is much applauded as the finest specimen of modern Latinity, and which was intended to

soften

CALVIN.

soften the unrelenting fury of that prince against the Protestants. This work has been always much admired by persons of similar sentiments, for the elegance of its style, the perspicuity of its method, and the force of its reasoning. It passed through several editions, which were successively enlarged and improved; it was translated by Calvin into French; and versions of it were made in all the principal modern languages. To some editions is prefixed the device of a flaming sword, with the motto, "Non veni mittere pacem sed gladium;" i. e. "I came not to send peace but a sword." After the publication of this work, Calvin went to Italy for the purpose of visiting the dukes of Ferrara, who was a convert to the reformed religion, and who received him with great kindness. On his return to France, he proposed to pursue his journey to Strasburgh or Basil; but being obliged, on account of the war that then prevailed, to pass through the territories of the duchy of Savoy, he took Geneva in his way; and being urged by the pressing solicitation of Farel, Viret, and other zealous reformers, to settle in that city, he accepted the offices of preacher and professor of divinity, which were conferred upon him with the consent of the people, by the consistory and magistrates. This settlement took place in 1536. In the following year he began to display his arbitrary spirit, by obliging all the people to swear solemnly to a body of doctrines, which also contained a renunciation of popery; and by refusing to celebrate the Lord's supper, till certain irregularities that subsisted in the church at Geneva were rectified. He also declared, that he could not submit to the regulations, which had been lately made by the Synod of the canton of Berne, and which required the use of unleavened bread in the eucharist, the baptismal fonts which had been removed out of the churches, and the feasts, which had been abolished, to be restored at Geneva. This occasioned a conflict, which terminated in an order of the assembly of the people, summoned by the syndics, that Calvin, Farel, and another minister, should leave the city within two days. Calvin retired to Strasburgh, where he was allowed to found a church according to his own model. There he married a wife; and published his "Commentary upon the Epistle to the Romans." During his absence, his friends at Geneva were very anxious for his return; and they at length prevailed, so that he arrived thither in September, 1541. After his re-settlement he began with establishing a form of ecclesiastical discipline, and a consistorial jurisdiction, invested with full powers to inflict all kinds of censures and canonical punishments, as far as excommunication. See CALVINISM. This establishment was much disapproved by several persons, who expressed their apprehensions, that papal tyranny would soon be revived. Calvin, however, was inflexible; and on all occasions asserted the rights of the consistory, of which he was perpetual president, as he also was of the assembly of the clergy. But fully apprised of the exorbitant power which accrued from this office, he advised, on his death-bed, that no person should again be invested with such authority; and after his time the office of president ceased to be perpetual.

Such was the extent of Calvin's ambition and views, that he formed a project of making the republic of Geneva the mother and seminary of all the reformed churches, as Wittenburg was of the Lutheran. From hence ministers were to be deputed to diffuse and support the protestant cause throughout the world. Here he designed to originate an uniform model of doctrine and discipline; and Geneva was to be, as it were, the "Rome" of protestantism. His plan was pursued with vigour and perseverance. An academy was instituted in this city, to which his own talents and

learning, and those of his colleague Beza, and of other eminent persons, attached a degree of reputation that attracted students from all countries where the reformation had taken root. The success of Calvin in his project was so great, that the presbyterian model of church government gradually held a kind of divided empire with the Lutheran and Protestant episcopalian. When Calvin had formed and established his system of doctrine and church government, (See CALVINISM,) he was too tenacious of his own opinion, and too arbitrary in the exercise of his authority, to allow any deviation or opposition among those to whom his influence extended. Of this unamiable peculiarity of his character, instances occur under the articles BLANDRATA, BOLSEC, and CASTALIO; but that which entails the greatest disgrace on his memory was his treatment of SERVETUS. Whilst he was passing through Geneva, in order to seek an asylum in Italy from the persecution of Roman catholics, he was apprehended at the instigation of Calvin, tried on a charge of blasphemy, condemned, and committed to the flames. The mere statement of this fact is sufficient to expose it; and no apology can be devised to extenuate it, but such as arises from the intolerant spirit which generally prevailed, and which, for many ages, it was thought not only lawful but laudable to exercise against persons who were deemed to hold unscriptural and heretical opinions, conceived to be inconsistent with the unity of the church, and the safety of the civil state.

The course of Calvin's life comprehended a great variety of pastoral cares and literary labours; and it was terminated by sickness and labour at comparatively an early period, in May 1564, as he was nearly completing his 55th year. The character of this learned and active reformer has been grossly calumniated by bigots of various descriptions; and more especially by those of the church of Rome. But it is justly observed by a liberal and candid biographer, that, whilst his morals, in the ordinary sense of the term, appear to have been irreproachable, his chief faults consisted in a resemblance to those uncharitable persons who have censured and traduced him. His extraordinary talents have been acknowledged by the most eminent persons of his age; and they were such as would have rendered him a distinguished scholar, if his attention had not been wholly, or at least principally, devoted to theological studies and ecclesiastical occupations. His writings are numerous. Besides his "Institute," he published learned commentaries upon most of the books of the New Testament, and upon the prophets in the Old. He refrained from commenting on the book of Revelation, much to his praise, according to the judgment of Scaliger and Bodin, because he thought it impenetrably obscure, and of dubious authority. Many zealous believers were offended by his applying to the temporal circumstances of the Jews several ancient prophecies that have been thought to refer to the Messiah, and to furnish arguments in confirmation of the Christian cause. In this respect, however, he thought for himself, and escaped the odium of fervile attachment to generally received opinions. To his other more elaborate works he added many controversial pieces; and all his treatises were collected in 1560, in 9 vols. folio. His opinions, which are now better known than his writings, have been the subjects of innumerable controversies. For an abstract of them, see the next article. Gen. Dict. Mosheim, E. H. Vol. iv. Gen. Biog.

CALVINISM, the doctrine and sentiments of Calvin, and of his followers, with regard to matters of religion.

Calvinism subsists in its greatest purity in the city of Geneva; and from thence it was first propagated into Germany, France, the United Provinces, and England. In
Germany,

Germany, we may reckon among its chief patrons, Frederick III. elector Palatine, who, in 1560, removed from their pastoral functions, the Lutheran doctors, and filled their places with Calvinists; and, at the same time, obliged his subjects to embrace the tenets, rites, and institutions of the church of Geneva. This order was abrogated in 1576 by his son and successor Lewis, who restored Lutheranism; but in 1583, Calvinism was again restored, under the government of the elector John Casimir, and became triumphant. In France it was abolished by the revocation of the edict of Nantes, in 1685. It has been the prevailing religion in the United Provinces ever since the year 1571. The theological system of Calvin was adopted, and made the public rule of faith in England, under the reign of Edward VI.; and the church of Scotland was modelled by John Knox, the disciple of Calvin, agreeably to the doctrine, rites, and form of ecclesiastical government, established at Geneva. In England it has declined since the time of queen Elizabeth; though it still subsists, some say a little allayed, in the articles of the established church; and in its rigour in Scotland. See REFORMATION, and REFORMED CHURCH.

The distinguishing theological tenets of Calvinism, as the term is now generally applied, respect the doctrines of PREDESTINATION, or *particular* ELECTION and REPROBATION, *original* SIN, *particular* REDEMPTION, *essential*, or, as some have called it, *irrepressible* GRACE in *regeneration*, JUSTIFICATION *by faith*, PERSEVERANCE, and the TRINITY. See each of these articles. See also ARMINIANS.

Besides the doctrinal part of Calvin's system, which, so far as it differs from that of other reformers of the same period, principally regarded the absolute decree of God, whereby the future and eternal condition of the human race was determined out of mere sovereign pleasure and free will; it extended likewise to the discipline and government of the Christian church, the nature of the eucharist, and the qualification of those who were intitled to the participation of it. Calvin considered every church as a separate and independent body, invested with the power of legislation for itself. He proposed that it should be governed by presbyteries and synods, composed of clergy and laity, without bishops, or any clerical subordination; and maintained, that the province of the civil magistrate extended only to its protection and outward accommodation. In order to facilitate an union with the Lutheran church, he acknowledged a real, though spiritual, presence of Christ in the eucharist, that true Christians were united to the man Christ in this ordinance, and that divine grace was conferred upon them, and sealed to them, in the celebration of it; and he confined the privilege of communion to pious and regenerate believers. See EUCHARIST, &c. and LUTHERANISM.

In France the Calvinists are distinguished by the name of Hugonots; and, among the common people, by that of Parpaillots. In Germany they are confounded with the Lutherans, under the general title Protestants; only sometimes distinguished by the name Reformed.

CALVINISTS, *crypto*, a name given to the favourers of Calvinism in Saxony, on account of their secret attachment to the Genevan doctrine and discipline. Many of them suffered by the decrees of the convocation of Torgaw, held in 1576. See FORM OF CONCORD.

The Calvinists in their progress have divided into various branches, or lesser sects.

CALVINO, *Cape*, in *Geography*, is the most westerly cape of the Morea, E. of Zante Island, and S.W. from the S. point of the entrance into the gulf of Lepanto.

CALVISANO, a town of the Bresian, belonging to the state of Venice; 12 miles S.S.E. of Brescia.

CALVISIANA, in *Ancient Geography*, a place of Sicily between Agrigentum and Hybla, on the route from Lilybæum to Messina, according to the Itinerary of Antonine. M. d'Anville places it at a little distance N.W. of Gala, on the southern coast.

CALVISIUS, SETHUS, or CALVITZ, in *Biography*, a German chronologer, was born at Grosse, in Thuringia, in 1556, held the office of chantor at Leipzig, to which he was appointed in 1582, and died in 1615. His principal work was his "Opus Chronologicum," published at Frankfurt in 1685, fol. In the compilation of this work, he adopted astronomical principles, and drew up astronomical tables, by means of which he fixed and compared different epochs. He also formed a system of chronology from the beginning of the world to his own time; in which he inserted the history of all ages, described by such circumstances, that even children might comprehend in their minds a continued series or synopsis of history. Scaliger speaks in terms of high commendation of this work, though the impression of it was for some time prohibited by the governors of the university of Leipzig. However, John Kepler the celebrated mathematician, and other persons of less note, wrote against it. Calvisius published at Erford in 1610, in 4to., "Enodatio duarum Questionum, viz. circa Annum Nativitatis et Tempus Ministerii Christi;" and in 1612, "Elenchus Calendarii Gregoriani, et duplex Calendarii melioris Forma," Franc. Marchionum, 4to. In this "Elenchus," he proposes two points; first, to explode the Gregorian calendar by the principles of astronomy, and next to point out a truer and more convenient form of a calendar. Calvisius is reckoned among the heretics of the first rank in the "Index Expurgatorius," published at Madrid in 1667. According to Walter, in his "Musical Lexicon," he was a very learned theorist, and good practical musician; of which he has left ample proofs to posterity in his short treatise called "ΜΕΛΟΠΟΙΑ, five Melodiæ condendæ ratio, quam vulgò musicam poeticam vocant, ex veris fundamentis extracta et explicata," 1592. This ingenious tract contains, though but a small duodecimo volume, all that was known at the time, concerning harmonics and practical music; as he has compressed into his little book the science of most of the best writers on the subject; to which he has added short compositions of his own, to illustrate their doctrines and precepts. With respect to composition, he not only gives examples of concords and discords and their use in combination, but little canons and fugues of almost every kind then known.

He composed, in 1615, the 150th psalm in twelve parts, for three choirs, as an Epithalamium on the nuptials of his friend Casper Ankelman, a merchant of Hamburgh, and published it in folio at Leipzig, the same year. Several of his hymns and motets appear in a collection of Lutheran church music, published at Leipzig, 1618, in eight volumes 4to. under the following title: "Florilegium portens CXV. selectissimas Cantiones, 4, 5, 6, 7, 8, voc. præstantissimorum Auctorum." Some of these we have had the curiosity to score, and have found the laws of harmony and fugue preserved inviolate. Gen. Dict. Burney's Hist. Music, vol. iii.

CALVISSON, in *Geography*, a town of France, in the department of the Gard, half a league E. of Sommières, and three S.W. of Nîmes.

CALVITI, a town of Naples, in the province of Calabria Citra; 11 miles E. of Cariati.

CALVITIES, or CALVITIUM. See BALDNESS.

CALUMET, in *Modern History*, a mystic kind of pipe used by the American savages as the ensign of peace, and for religious fumigation. This is a symbol of friendship universal

universal among the people of North America, and the presentation of it is an usage of arbitrary institution peculiar to them. The acceptance of it is a token of concurrence with the terms proposed; and the refusal as certain a signal of rejection. When this pipe is offered, even in the midst of the rage of a conflict, the weapons of hostility drop instantly from their hands, and a truce ensues.

The calumet is a sort of tobacco-pipe, made of red, black, or white marble. When they treat of war, the pipe and its ornaments are commonly red. The shank is decorated with rounds of feathers, and locks of hair, or porcupine quills: in it they smoke in honour of the sun. M. Lafitau will have it to be the original CADUCEUS of Mercury, of which that used by the Greeks and Romans, with its wings and its serpents, was only the copy.

The calumet is the symbol and security of traffic; by it they pronounce life and death, peace and war: they also ascribe to it a power of raising the souls of the dead.

Among the Indians, there is also a solemn rite, called the "dance of the calumet," which they perform on various occasions. They are not allowed to wash themselves in the rivers at the commencement of summer, nor to taste the new fruits, without performing it; and the same ceremony always confirms a peace, or precedes a war. In winter it is performed in their cabins, and in summer in the open fields. Having chosen a spot among trees, shaded from the heat of the sun, they lay in the middle of it a large mat, and set upon it the monitor, or god, of the chief of the company. On the right hand of this image, they place the calumet, as their great deity, erecting around it a kind of trophy with their arms. Those who are to sing on the occasion take the most honourable seat under the shade of the trees. When the company is arranged, each person, before he sits down, salutes the monitor, by blowing upon it the smoke of their tobacco; then every one in rotation receives the calumet, and holding it with both hands, dances to the cadence of the vocal music, which is accompanied by the beating of a sort of drum. During this exercise, he gives a signal to one of their warriors, who, taking a bow, arrow, and axe, out of the trophies above-mentioned, fights him; whilst he defends himself with the calumet only; and both of them continue the pastime of dancing. When this mock-engagement is concluded, he who holds the calumet makes a speech, recounting the battles he has fought, and the prisoners he has taken, and then receives a cloak, or some other present, from the chief of the ball. He then resigns the calumet to another; who, having acted a similar part, delivers it to a third person; and thus in rotation, till at last the instrument returns to the person who began the ceremony; by whom it is presented to the nation invited to the feast as a mark of friendship, and a confirmation of their alliance, when this is the occasion of the entertainment.

CALUMET, *Grand*, in *Geography*, a portage of Lower Canada, in North America, on the northern bank of the river Utawas. This is the longest carrying place on this river, and is about two thousand and thirty-five paces. It is a high hill or mountain. From the upper part of this portage the current is steady, and is only a branch of the Utawas river, which joins the main channel, that keeps a more southern course, at the distance of 12 computed leagues. Six leagues further it forms lake Coulonge, which is about four leagues in length; from whence it proceeds through the channels of the Allumettes to the portage, where part of the lading is taken out, and carried 342 paces. Then succeeds the portage des Allumettes, which is but 25 paces, over a rock difficult of access, and at a

short distance from lake Coulonge. From portage de Chenes to this spot is a fine deer-hunting country, and the land in many parts fit for cultivation. From hence the river spreads wide, and is full of islands, with some current for seven leagues, to the beginning of "Riviere Crease," or DEEP RIVER. Grand Calumet lies in N. lat. 45° 40'. W. long. 77° 10'. Mackerzie's Voyages. Introd. p. 33.

CALUMNY, the crime of accusing another falsely, and knowingly of some heinous offence. *Calumnia est malitiosa & mendax informatio.*

It is an ancient maxim, which experience shews us to be too well founded: *Audacter calumniare, semper aliquid heredit.*

CALUMNY, *oath of, Juramentum*, or rather *Jurjurandum calumnie*, among civilians and canonists, was an oath which both parties in a cause were obliged to take; the plaintiff, that he did not bring his charge, and the defendant, that he did not deny it, with a design to abuse each other, but because they believed their cause was just and good; that they would not deny the truth, nor create unnecessary delays, nor offer the judge or evidence any gifts or bribes. If the plaintiff refused this oath, the complaint or libel was dismissed; if the defendant, it was taken *pro confesso*.

This custom was taken from the ancient athletes, who, before they engaged, were to swear they had no malice, nor would use any fraudulent or unfair means for overcoming the other. The *juramentum calumnie* is much disused as a great occasion of perjury. Anciently the advocates and proctors also took this oath; but of late it is dispensed with, and thought sufficient that they take it once for all at their first admission to practice.

CALUMNIÆ, *judicium*, was an action brought against the plaintiff in a court for a false and malicious accusation. When an accuser did not prove his charge, nor seemed to have sufficient or probable grounds for bringing any, the judges in pronouncing sentence used the formula *calumniatus es*; which gave the defendant a right to bring an action of calumny; the penalty of which was *frontis iniustio*, or burning on the forehead. See ACCUSATION.

CALUMNY, in the *Arts*, was admirably personified by Apelles. This celebrated painter was accused of having conspired against Ptolemy, king of Egypt; and being delivered from the danger that threatened him, he determined to avenge himself of the calumny by a picture, which was always held in high estimation. On the right was seated a man with large ears, resembling Midas; he stretched out his hand towards Calumny, who approached him; and near him were placed two female figures, those of Ignorance and Diffidence. On the other side stood Calumny, who was a beautiful female, that appeared agitated and enraged: she held in her left hand a flaming torch, and with her right she dragged by the hair a youth, lifting his hands towards the heavens, and calling the gods to witness in his favour. Before her moved a pale and deformed man, with piercing eyes, who seemed to have just recovered from a long illness: this was Envy. Two other females conversed with Calumny; these were Concealment and Deceit. Another female followed, clothed in black, with tattered garments, which was Repentance: she turned her head backward, dissolved in tears, and looked with shame on Truth, who approached her. Lucian, in his "Dialogue against Calumny," has transmitted to us this model of moral allegory.

CALVORD, in *Geography*, a town of Germany, in the circle of Lower Saxony, and duchy of Magdeburg; 24 miles N.W. of Magdeburg.

CALUPENA, in *Ancient Geography*, a country of Asia, on the frontiers of the Lesser Armenia, and of the country of Lanafena,

Lanafena, according to Strabo (vol. ii. p. 838,) who says, that it belonged to the priest of the temple of Zela.

CALUS, *Eſbet*, a river of Asia, whose mouth was S.W. of the town of Rhizæum, in a bay of the Euxine sea, at some distance E. of Trapezus.

CALUSIO, in *Geography*, a town of Italy, in the principality of Piedmont; 5 miles N. of Chivasso.

CALW, a town of Germany, in the circle of Swabia, and duchy of Wurtemberg, on the Nagold, having a manufacture of serges and of china; 16 miles W. S. W. of Stuttgart, and 24 E. S. E. of Rastadt.

CALX. See CALCINATION and LIME.

CALX of Antimony. See ANTIMONY.

CALX of brass, is called *ÆS USTUM*.

CALX jovis, the *calx* of TIN, called PUTTY.

CALX lunæ, the *calx* of SILVER.

CALX martis, the *crocus* or saffron of IRON.

CALX mercurii, precipitated MERCURY.

CALX nativa, in *Natural History*, a native marley earth, which, without burning, has some of the qualities of the artificial lime, and was called by the ancients, *gypsum tympaicum*. See CALCAREOUS EARTHS.

CALX nitrata. See NITRE of lime.

CALX saturni, is ceruss calcined with spirit of vinegar, or in the sun. See CERUSSE.

CALX saturni, is also used for MINIMUM OF RED LEAD.

CALX solis, denotes calcined GOLD.

CALX terre, a denomination given by Paracelsus to the solar and argillaceous earths. He has also given the name of calx to the chalky matter formed in the joints of gouty persons.

CALX veneris, VERDIGRISE.

CALX viva, quick-lime, that on which no water has been cast since its burning, in opposition to *calx extingua*, that slacked by the affusion of water. See LIME.

CALX viva philosophorum, denotes that made of quick-silver.

CALX, in *Anatomy*. See CALCANEUM.

CALYBE, in *Ancient Geography*. See CARYLE.

CALYBE, in *Mythology*, an ancient priestess of the temple of Juno, the form of which is assumed by the fury Alecto, in the *Æneid*, in addressing Turnus.

CALYBE, in *Ornithology*, *Calybé de la Nouvelle Guinée*, Buffon, the blue green bird of paradise, described by Gmelin under the title of *Paradisæa viridis*.

CALYBITES, the inhabitants of a cottage, an appellation given to divers saints on account of their long residence in some hut, by way of mortification. The word is formed from *καλυπτω*, *togo*, I cover; whence *καλυβη*, a little cot.—The Romish church commemorates St. John the *calybites* on the 15th of December.

CALYCADNUS, in *Ancient Geography*, a river of Asia, in Cilicia Trachea; whose mouth was between the two promontories of Zephyrium and Sarpedon. The same name is also given by Livy and Appian to a promontory of Asia, supposed to be the same with Zephyrium.

CALYCANthemæ, in *Botany*, (from *καλυξ*, *calyx*, and *ανθος*, *flower*,) the fortieth of the natural orders of Linnæus, in his *Philosophia Botanica*, and the seventeenth of his posthumous lectures, published by Giseke. In the *Philosophia Botanica*, it contains the following genera, *epilobium*, *ænothera*, *jussæa*, *ludvigia*, *oldenlandia*, *isnardia*, *ammanina*, *peplis*, *lythrum*, *glauca*, and *rhexia*. In the posthumous lectures, *oldenlandia* is withdrawn, and the following added: *gaura*, *grisea*, *mentzelia*, *loosa*, *frankenia*, *melastoma*, and *osbeckia*. In some of these genera the calyx is superior, and in others inferior; but in all it supports the stamens, and if there be a corolla, of course that likewise.

The name is derived from this circumstance, but it is not well chosen, as many plants which have the same character are not included under it.

It is also the seventh order of the fourteenth class in the system of Ventenat, where, though founded on the same general idea, it is still less comprehensive. Its genera are *pemphis*, *giuoria*, *lawsonia*, *lythrum*, *acisanthera*, *parsonia*, *cuphea*, *isnardia*, *ammanina*, *glauca*, and *peplis*. In all these the calyx is inferior; and the corolla, when present, is inserted upon it, alternating with its divisions.

CALYCANthus, in *Botany, (from *καλυξ*, *calyx*, and *ανθος*, a flower, so called because the calyx resembles a corolla.) Linn. gen. 639. Schieb. 870. Willd. 1005. Juss. 342. Vent. vol. iii. p. 357. (*Butneria*, Duham. *Bastaria*, Miller, *Beureria*, Ehret.) Class and order, *icosandria polygynia*. Nat. ord. undetermined by Linnæus. *Rosaceæ*, Juss. Allied to the *rosaceæ*, Vent.*

Gen. Ch. *Cal.* perianth one-leaved, pitcher-shaped, deeply divided, segments numerous, linear-lanceolate, coloured. (Caducous, Vent.) *Cor.* petals numerous, strap-shaped, acuminate, attached to the calyx within its divisions, and exactly resembling them. *Stam.* twenty, much shorter than the petals; anthers oblong, erect, furrowed. *Pist.* germs numerous, superior; styles awl-shaped, compressed, the length of the stamens; stigmas glandulous. *Per.* none, except the bottom of the calyx, which thickens, becomes succulent, and takes the form of a berry. *Seeds* many, tailed.

Eff. Ch. *Calyx* one-leaved, pitcher-shaped, with coloured segments. *Petals* resembling the segments of the calyx. *Seeds* many, tailed, within a succulent calyx.

Obf. Linnæus gives the flower no corolla, but a calyx with many divisions in two concentric ranks, all resembling petals; and Schreber and Martyn adopt his ideas. But we have preferred the description of La Marck and Ventenat, Jussieu having observed, that the inner rank probably consists of petals; and Linnæus himself having, perhaps, incautiously, doubtless inconsistently, admitted the term petals into both his specific characters. Sp. 1. *C. floridus*, Carolina all-spice, Linn. Sp. pl. La Marck, Illuf. Pl. 445. fig. 1. (*Butneria*, Duhamel, Tab. 45. *Bastaria*, Mill. icon. 60. *Beureria*, Ehret. Tab. 13. *Frutex corni foliis*, Catesb. Car. 1. p. 46. Tab. 46.) "Petals longer than the divisions of the calyx." A shrub three or four feet high, or more in its native country. *Stem* irregularly branched, covered with a brown aromatic bark. *Leaves* opposite, petioled, egg-shaped, acute, entire, on short petioles. *Stipules* none. *Flowers* of a dusky purple colour, about an inch and a half or two inches in diameter; the petals incurved at the top; peduncles short, solitary, pubescent. A native of Carolina. Bosc asserts, from his personal observation in Carolina, that Linnæus has confounded two distinct plants under one name. Both have opposite, egg-shaped, lanceolate leaves, without stipules, but those of one are pubescent and large, of the other, smooth and smaller; the flowers of the former are also larger, of a deeper red colour, and have a strong unpleasant smell, which those of the latter have not. Professor Martyn mentions two varieties, the one with oblong, the other with roundish, egg-shaped leaves, but they do not correspond with Bosc's two species, the latter of which does not appear to be known in England. The former was introduced into our gardens, by John Catesby, so early as 1726. It will thrive in the open air, if planted in a warm situation and dry soil. It is propagated by laying down the young branches, which should be done in Autumn; in the spring twelvemonth after, the layers should be separated from the parent stock, and set where they are designed to remain.

remain. Some old tanners' bark should be laid on the surface to keep out the frost while the plants are young. Bosc informs us, that the flowers and ends of the branches infused in brandy make a pleasant liquor, and that the seeds are thought, in America, to be poisonous to dogs and foxes. *z.C. praeox*, Linn. Sp. La Marck Illust. Pl. 445. fig. 2. (Obai or Kobai, Kämpf. Amæn. 878. Tab. 879.) "Petals shorter than the divisions of the calyx." *Leaves* egg-shaped lanceolate. *Flowers* appearing before the leaves, yellow; petals small, besprinkled with red spots. *Fruit* longer, scaly and rough. *Seeds* five or six, which soon lose their tail, and resemble French beans. A native of Japan and China, introduced into England in 1771.

CALYCERA, (from *καλυξ*, *calyx*, and *κερας*, a horn.) Willd. Cavan. ic. 4. p. 34. Tab. 358. Clafs and order, *Syngenesia segregata*.

Est. Ch. Common calyx many-leaved; proper calyx five-toothed. Florets tubular, male and hermaphrodite. Receptacle chaffy. Seeds naked.

Sp. C. *herbacea*. Root fungous. *Stems* a foot high, erect, simple, smooth, round, hollow. *Leaves* linear-lanceolate, pinnatifid, toothed; stem ones nearly sessile; radical ones on long petioles. *Flowers* compound, globular, terminal; barren and fertile florets intermixed; teeth, in the barren florets, egg-shaped, acute, very short; in the fertile ones, lanceolate-awl-shaped, twice the length of the corolla. *Seed* single, naked, at the bottom of the calyx. *Receptacle* somewhat globular. A native of Chili.

CALYCIFLORÆ, a natural order formed by Linnæus for four genera, *Osyris*, *Trophis*, *Hippophæ*, and *Elæagnus*; but, as we learn from Giske, afterwards abolished.

CALYCIFLORUS in *Zoology*, a species of *BRACHIONUS*, first described by Baker in his *Essays on the Microscope*, and since by Professor Pallas. It is defined by the latter as being of a simple form, calyculate, with the shell crenated behind, and the upper lip of the mouth four-toothed. Invisible to the naked eye. Found in water.

CALYCINA, in *Entomology*, a species of *ARANEA*, the abdomen of which is globose, and of a pale, yellowish colour. The insect is thus described by Linnæus in his *Fauna Suecica*, as a Swedish species. Scopoli calls it *aranea Kleyinii*. This kind of spider secretes itself in the calyces of flowers from which the corolla has fallen, and fastens on the flies that are tempted to the calyces in search of the nectareous juices.

CALYCISTÆ, in *Botany*, a name given by Linnæus to those botanists who have arranged plants from a regard chiefly or solely to their calyx. Magnol and Linnæus himself are the only authors mentioned who have attempted this method.

CALYCLE, a term invented by Vaillant to express a series of leaves surrounding the base of the calyx, generally shorter, of a different shape, and making a kind of double calyx; as in *crepis*, *dianthus*, *malva*, &c. Linnæus in his *Philosophia Botanica* calls such a calyx *auctus*; but in his practical works he is by no means uniform in his manner of expressing this circumstance. In the *Systema Naturæ*, he describes the calyx of *crepis* and other kindred genera as caly-cled; but in the *Genera Plantarum* he styles it sometimes *auctus* and sometimes *duplex* or *double*. This latter term he applies to the calyx of *malva*, &c. That of *dianthus* he calls *scaly*. The term is also used by Linnæus to denote the small permanent perianth which crowns the seed of *scabiola*, *arctotis*, and some other genera, and is supposed, like the down attached to the seed of most syngencious plants, to facilitate its dispersion. According to Gærtner, a seed is caly-cled when its crust is extended above its vertex, so as to

form a one-leaved cup: it is either entire as in *tanacetum*, *pyrethrum*, *dipsacus*, &c. or halved as in *melampodium* and a few others. If there be more than one leaf it is considered by him as a different kind of pappus which he calls *chaffy*. The term *calycle* is therefore employed by him less extensively than it is by Linnæus. See his general Introduction, p. 126.

CALYCOPTERIS, a generic name given to a shrub figured by La Marck in his *Illustrations*, which belongs to decandria monogynia of the Linnæan system. But there is no article under that name in the alphabetical part of the *Encyclopedie*; and as the letter-press of the *Illustrations* is not completed, we are not able to determine its proper generic character, nor of what country it is a native.

CALYDERMUS, (from *καλυξ*, *calyx*, and *δερμα*, a skin or thin rind) a genus formed by the authors of the *Flora Peruvensis* for the *atropa physaloides* of Linnæus, which differs from the other species in having a dry five-celled berry, and a calyx with arrow-heart-shaped divisions, covering the fruit.

CALYDNA INSULA, in *Ancient Geography*, a single island according to Steph. Byz. and **CALYDNÆ INSULÆ**, a group of islands, according to Homer, who seems to place them near the island of Rhodes. Some have thought that by this general appellation the poet designed to express the Sporades. Strabo, in speaking of their honey, places them near Tenedos; and M. d'Anville supposes, that they are two rocks, which are still found, one before and the other to the right of the port of Tenedos.

CALYDON, a city of Ætolia, pleasantly and commodiously seated on the river Evenus, which passed through it. This city, which seems to have continued for some time the residence of the ancient Ætolian kings, was built by Calydon, the son of Ætolus, from whence the kingdom was called Calydonia, though it afterwards resumed its ancient appellation. Hercules came to this city after he had left Peloponnesus; and though he had a numerous spurious brood, scattered over all Greece, yet, desirous of legitimate issue, he is said to have married Dejanira, the daughter of Ceneus, king of the country, and father to Meleager; and with a view of ingratiating himself with the Ætolians, to have turned the current of the river Achelous, or to have made such improvements in its channel, as to have given rise to the fable of his having vanquished it in single combat. Calydon was situated near the forest of that name, where Meleager, accompanied by the noblest youths of Greece, slew the famed Calydonian boar. This fierce and monstrous animal had done so much mischief in the neighbourhood, that Meleager, king of the country, who kept his court at Calydon, was forced to call to his assistance a great number of the most distinguished persons of Greece in order to destroy it. The chief of these were Theseus, Telamon, Peleus, Pollux, and Iolaus, all of them the faithful companions of Hercules, besides a number of other heroes. To these we may add the famous Arcadian princeess Atalanta, who behaved with such uncommon courage and intrepidity upon this occasion, that Meleager became enamoured with her, and married her. If we may credit Pausanias, (Arcad. cap. 46.) one of the tusks of this boar, which was preserved in the temple of Bacchus, in the imperial gardens, was above a yard long, and therefore his size must have been very great. Some imperial Greek medals were struck in the city of Calydon.

CALYMERE Point, in *Geography*, lies on the southern extremity of the east coast of the Carnatic country, in Hindoostan, near Negapatam. N. lat. 10° 20'. E. long. 79° 54' 30".

CALYMNA, in *Ancient Geography*, an island of the Mediterranean sea, upon the coast of Asia, before Carpathum, according

according to Pliny. Ovid says, that it produced abundance of honey. It was one of the Sporades, S.W. of Leros, and N.W. of Cos. See CALAMO.

CALYNDA. See CALINDA.

CALYPARIS, *Fiume Cassibile*, a small river of Sicily, on the eastern coast.

CALYPLECTUS, in *Botany*, (from *καλυξ*, *calyx*, and *πλεκτος*, *plaited or folded*.) Flor. Peruv. Pl. 13. Class and order, *icofandria monogynia*.

Gen. Ch. *Cal.* perianth bell shaped, leathery, caducous, with from ten to twelve plaits, and from ten to twelve teeth. *Cor.* petals from ten to twelve, attached to the folds of the calyx. *Stamens* about thirty. *Pist.* germ superior, globular, striated; stigma simple. *Peric.* capsule globular, one-celled, longitudinally striated in its upper part, opening irregularly. *Seeds* numerous, flat, membranous.

CALYPSO, in *Entomology*, a species of PAPILIO, (Dan. Cand.) so named by Fabricius in his *Species Insectorum*, and by other writers. This butterfly is specifically distinguished by having the wings roundish; dot, and tip of the anterior pair black; posterior ones yellowish beneath, and the margin dotted with black. Inhabits Sierra Leona.

CALYPSO, in *Fabulous History*, the daughter of Oceanus and Thetis, or, according to Homer, the daughter of Atlas, who reigned over the island of Ogygia in the Ionian Sea; hence called the "Island of Calypso." Here she received Ulysses on his return from the Trojan expedition, and detained him seven years, offering to make him immortal if he espoused her. But Ulysses, retaining in recollection his beloved Penelope, preferred a residence in the isle of Ithaca, to all the advantages which Calypso proposed, and took his leave of the goddess, though not without regret. The name of Calypso is derived from *καλυπτειν*, to conceal. Many different islands, very remote from one another, have been assigned to Calypso; among which, besides Ogygia, are Aea, and that which bears her name before Puzzuoli.

CALYPTRA, in *Botany*, (*καλυπτρα*, a veil, from *καλυπτω*, to cover,) a term used by old authors for that kind of seed covering, which Linnæus calls arillus; but afterwards transferred by Dillenius and others to that fugacious conical covering which invests the capsules of mosses before they arrive at maturity. Linnæus, who mistook the capsule for an anther, considered it as a species of calyx. Hedwig at first regarded it as the corolla, but was afterwards convinced that it is properly part of the pistil, and that its first office is to strengthen the attachment of the style to the germ. But as, from his own description, in its early state it invests the essential parts of the fructification, it is, as Linnæus made it, properly a species of calyx. When the germ becomes enlarged, the calyptra is torn all round from the base of the receptacle, and carried up by the capsule.

CALYPTRANTHES, from *καλυπτρα*, a veil, and *ανθος*, a flower,) Willdenow, 974. Schreb. 845. Swartz. Prod. 79. Class and order, *icofandria monogynia*. Nat. Ord. *Myrti*.

Gen. Char. *Cal.* perianth one-leafed, bell-shaped, truncate, without teeth, or very slightly four-toothed; superior, permanent; covered before the time of flowering with a round, concave, deciduous operculum or lid. *Cor.* none. *Stam.* filaments numerous, capillary, inserted within the rim of the calyx; anthers roundish, double, small. *Pist.* germ roundish, fastened to the bottom of the calyx: style, simple, thread-shaped, inflexed, the length of the stamens; stigma obtuse. *Peric.* berry globular or oblong, crowned with the calyx. *Seeds* from one to four, somewhat angular.

Eff. Ch. *Calyx* superior, truncate, covered till the stamens

and pistil become mature, with an entire deciduous lid. *Corolla* none. *Berry* one-celled. *Seeds* from one to four. Obs. It differs from *Encalyptus* in having a berry, not a capsule.

Species, 1. *C. chytraculia*, Willd. Swartz. Prod. 79. Fl. ind. occid. 2. p. 921. (*Myrtus Chytraculia*, Linn. Sp. Chytraculia, Brown Jam. 239. tab. 37. fig. 2.) "Peduncles terminal, panicled, trichotomous, downy; leaves egg-shaped, attenuated at the top." A tree. *Leaves* smooth, opposite. *Lid* fastened to the calyx laterally, but it afterwards turns back, and then the filaments come out, which before had been twisted and concealed. It is reckoned an excellent timber wood, but seldom exceeds 14 or 15 inches in diameter. A native of Jamaica, where it is called bastard-green-heart. 2. *C. zuzygium*, Willd. Swartz. Prod. 79. Fl. ind. occ. 2. p. 919. (*Myrtus zuzygium*, Sp. Pl. Zuzygium, Brown. Jam. 240. tab. 7. fig. 2.) "Peduncles axillary, trichotomous, spreading; leaves egg-shaped, obtuse; branches dichotomous." A bushy shrub, 10 or 12 feet high. *Style* longer than the stamens; stigma acute. *Berries* black. *Seeds* four, smooth, slightly angular, one or two only generally coming to maturity. A native of Jamaica. This and the preceding were introduced into England in 1778 by Dr. Thomas Clark. 3. *C. rigida*, Willd. Swartz. Prod. 80. Fl. ind. occ. 2. p. 923. "Peduncles solitary, about three-flowered: leaves egg shaped, acute, convex, veinless, rigid." A shrub. A native of Jamaica. 4. *C. guineensis*, Willd. "Peduncles axillary and terminal, in corymbs; leaves oblong, attenuated at the top and bottom, reticulated." A shrub. *Leaves* opposite, entire, shining on their upper surface. *Corymbs* divaricated; peduncles two-flowered. A native of Guinea.

Obs. Professor Martyn has adopted the idea of Schreber, in considering the *Jambolifera* of Linnæus and the *Calyptranthes* of Swartz as one genus, and has accordingly added the *Jambolifera pedunculata* of Linnæus and the *J. odorata* and *resinosa* of Loureiro. Willdenow concurs with him, and has also adopted into this genus *Eugenia caryophyllifolia* of La Marck, quoting *Myrtus cumini* of Linnæus as a synonym. But as all these plants are expressly said to be furnished with petals, and as the first three have only eight stamens, they cannot belong to *Calyptranthes*, while its generic characters remain as they now stand. The genus *Jambolifera* was formed by Linnæus for a single species, to which he attributed only eight stamens, and which he supposed to be the same as the *Jambolana* of Rumphius, and the *Caryophyllus tanga* of Plukenet; but La Marck assures us that he has in his Herbarium two species, one of which is incontestibly the plant of Rumphius, and the other that of Plukenet, which Linnæus erroneously supposed to be one and the same, both which have many stamens. Gærtner also, who has continued the genus, describes it as having many stamens, and supposes that Linnæus formed his generic character from an incomplete specimen. The two new species added by Loureiro are indeed stated to have only eight stamens; but if they agree with the original species of Linnæus in all their other characters, a difference merely in number will not warrant their separation. They may all be properly placed under *Eugenia*, which, as Dr. Smith has observed (Linn. Transf. v. 3. p. 281.), will include also Gærtner's *Syzygium*; but in that case we must attribute to the genus an indefinite number of stamens from eight to forty or more.

CALYTRIPLEX, in *Botany* (so called from its treble calyx). Flora Peruv. Pl. 19. Class and order, *didynamia angiospermia*.

Gen. Ch. *Calyx* treble, permanent; outer one consisting of

of two awl-shaped leaflets; middle one with three egg-shaped, acute divisions; inner one of two lanceolate leaflets. *Cor.* irregular; tube short; border with five nearly round segments; the two upper ones larger. *Stam.* four. *Pist.* germ superior, compressed; style thread-shaped, declining, the length of the stamens; stigma capitate. *Peric.* capsule egg-shaped, two-celled, two-valved. *Seeds* numerous, small, furrowed, striated; receptacle fixed to the valves.

Eff. Ch. Calyx treble. An herbaceous plant, native of Peru.

CALYX, or **CALIX**, in a general sense, denotes a **CUP**. See **CHALICE**.

CALYX, in *Ancient Aqueducts*, denoted a brazen module or cup, put over a head or castellum, to which pipes were fitted.

CALYX, in *Botany*, *καλυξ*, a covering, from *καλυπτω*. The word is used by Greek writers for a rose bud, in which the proper flower or corolla of modern botanists is not opened, but lies concealed under an envelope. It is thus explained by Suidas, *καλυξ*, *ανθος ροδης μεμυκος*: the flower of the rose shut up. And again, *καλυκας*, *συμπεργας*, *ροδα κεκαλυμμενα*, which clearly points out the etymology. Hefychius, long before him, had given the same general idea. *Καλυξ*, *το ανθος της ροδης, το μη εκπετασθαι*: the flower of the rose not expanded. Aquila, still earlier, in his version of Isaiah, ch. xxxv. 1. had translated the Hebrew word *בזמבנה*, *καλυξ*, which, Jerom says, is a better rendering than *πριον* of the Septuagint, or liliun of the Vulgate. Florebit ut liliun, five ut significantius expressit Aquila, *ως καλυξ*, quam nos tumentem rosam, & necdum foliis dilatatis possumus dicere. It shall flourish as a lily, or as Aquila more significantly expresses it, as a calyx, or swelling rose, whose flower-leaves are not yet expanded.

By these writers the bud itself, in its entire substance, is called a calyx: though the admission of *συμπεργας*, by Suidas, as a synonym of *καλυκας*, may seem to imply only the envelope, to which the term has been applied by modern botanists. According to Ray, it is the case (folliculus) in which, first the flower, and afterwards the seed of herbaceous plants, and the fruit of trees is enclosed: but the latter part of the definition must certainly be received, with numerous exceptions.

Through a similarity in sound, and in many cases, a resemblance in form, it was very early confounded with calix, a cup; but as it is almost universally spelt with a y in the last syllable, its derivation and proper meaning cannot be doubted. It is the envelope case or sheath in which the tender flower lies for a time concealed, and by which it is, in most cases, afterwards supported and protected.

Linnæus has followed Cæsalpinus in considering the calyx as a prolongation of the cortex, or outer bark of the plant; and has distinguished it into seven different kinds: 1. A perianth, contiguous to the other parts of the fructification. This is frequently called empalement or flower-cup by English writers, and to it, as professor Martyn well observes, should the term, cup, if admitted at all, be confined. 2. An involucre, remote from the flower, as in many umbelliferous plants. 3. An amentum or catkin, from a common, chaffy, gemmaceous receptacle. 4. A spathe bursting longitudinally. 5. A glume, formed of valves embracing the seed. 6. A calyptra, covering the capsules of mosses like a hood. 7. A volva, a membranaceous covering to the fructification of the fungi. See those words. The involucre is rather a number of bractes; and the amentum, a species of inflorescence.

CALYXHYMENIA. Ortega Decad. Bot. Flor. Peruv. Pl. 75. Class and order, *triandria monogynia*. Vol. VI.

Gen. Ch. Cal. with five divisions. *Cor.* bell-shaped; border with five plaited divisions. *Stam.* three. *Pist.* germ superior; style curved; stigma capitate. *Peric.* drupe egg-shaped, one-seeded, enclosed in the calyx.

Four species of this genus are figured in the *Flora Peruvienfis*, which are all herbaceous plants with jointed stems, and opposite, petioled, egg-shaped, entire leaves. They are nearly allied to *mirabilis*: and according to Bosc, from whom we are obliged, not having the *Flora Peruvienfis* at hand, to translate this article, and whose information, as usual, is mutilated and unsatisfactory; there ought to be added to them the *mirabilis viscosus* of Cavanilles, which has been formed into a distinct genus by Tuna, under the name of *Vitmania*, and by P'Heretier, under that of *Oxybaphus*.

CALZADA, in *Geography*, a town of Spain, in Old Castile, once the see of a bishop, united to that of Calahorra; 40 miles W. of Calahorra. N. lat. 42° 12'. W. long. 2° 47'.

CAM, or **GRANT**, a river of England, which passes by Cambridge, and joins the Ouse, three miles south from Ely.

CAM, one of the smaller Virgin islands in the West Indies, N. lat. 18° 20'. W. long. 63° 25'.

CAM's Bank, lies on the coast of Flanders, W. of the Broer's bank, within which a ship may run through and ride by the land in all winds.

CAMA, or **CAMEIA**, in *Ancient Geography*, a town of Asia in Armenia; the chief city of the Manichees.

CAMAC, **PORTO**, in *Geography*, lies on the north side of the island of Candia, to the S. of the Archipelago islands, and on the E. side of Cape St. John, having several islands in its mouth.

CAMACÆ, and **CAMÆ**, in *Ancient Geography*, the denomination of distinct people, classed by Pliny among the Scythian nations on this side of mount Imaus.

CAMÆA, in *Natural History*, the name of a genus of the semipellucid gems, the characters of which are these: they are obscurely transparent stones approaching to the onyx structure, being composed of zones, and formed on a crystalline basis, but having their zones very broad and thick, and laid alternately on one another with no other matter between them.

Of this genus we have four known species:

1. The dull-looking onyx, with broad black and white zones. This is the *camæa* of the moderns, and the Arabian onyx. It is found in Egypt, Arabia, Persia, and the East Indies. 2. The dull broad-zoned green and white *camæa*, or the *jaspicamæo* of the Italians: found in the East Indies, and in some parts of America. 3. The hard *camæa*, with broad white and chestnut-coloured veins. 4. The hard *camæa* with bluish, white, and flesh-coloured broad veins, being the *fardonix* of Pliny's time, brought only from the East Indies.

CAMAHA, in the *Materia Medica*, a name given by Avicenna and others to the large truffles found in the deserts of Numidia, and many other parts of Africa, in great abundance. These are white on the outside; the modern Africans call them *terfon*, and are very fond of them; they eat them stewed with milk, water, and spices, and account them wholesome and nutritive.

CAMAIEU, or **CAMAYEU**, in *Mineralogy*, a word used to express a peculiar sort of onyx: also by some to express a stone, whereon are found various figures, and representations of landscapes, &c. formed by a kind of *lusus naturæ*; so as to exhibit pictures without painting. The word comes from *camehuia*, a name the Orientals give to the onyx, when they find, in preparing it, another colour; thus expressing a *second stone*. It is of these *camaieux* Pliny is to be understood, when

when he speaks of the manifold picture of gems, and the party-coloured spots of precious stones: *Gemmarum pictura tam multiplex, lapidumque tam discolors macule.* Plin. Hist. Nat. lib. ii. c. 93.

CAMAIEU is also applied by others to those precious stones, as onyxes, cornelians, and agats, whereon the lapidaries employ their art to aid nature, and perfect those representations. See CAMÆA.

CAMAIEU is also frequently applied to any kind of gem, whereon figures may be engraven either indentedly, or in relievo. In this sense the lapidaries of Paris are called in their statutes *cuteurs of camayeux*. A society of learned men at Florence undertook to procure all the *cameos* or *camayeux*, and intaglios in the great duke's gallery, to be engraven; and began to draw the heads of divers emperors in *cameos*.

CAMAIEU is also used for a painting, wherein there is only one colour; and where the lights and shadows are of gold, wrought on a golden or azure ground. When the ground is yellow, the French call it *cirage*; when grey, *griffaille*. This kind of work is chiefly used to represent basso relievos: the Greeks call pieces of this sort *μονοχρωματα*.

CAMAIL, in *Ornithology*, synonymous with cravatte, according to Buffon, and other French writers, the black-faced tanager of Latham, and tanagra atra of Gmelin. This is a bird that inhabits Guiana, is about seven inches long, and of a cinereous colour, with the face, chin, and throat of the male black; and of the female, brown.

CAMAINES, GRAND, in *Geography*, a large island, with low and smooth land, and trees on the top, about 46 or 48 leagues W.N.W. from the west point of Jamaica. The island is well stored with turtle.

CAMAINES, *Little*, are two islands, the westernmost of which is called Camin Brack. They lie E.N.E. about 20 leagues from the Grand Camaines. The people of Jamaica catch many turtles here.

CAMALA, or GAMALA, in *Ancient Geography*, a town of Spain, 24 miles from Iacobriga. Anton. Itin.

CAMALA, in *Geography*, a river that lies on the E. coast of Africa, within the long reef or sand bank from Cape Corientes to the Barras Vermulas, an extent of at least 400 miles.

CAMALDULIANS, CAMALDUNIANS, or CAMALDOLITES, in *Ecclesiastical History*, an order of religious, founded by Romuald, an Italian fanatic, in 1023, in the horrible desert of Camaldoli, otherwise called Campo-Malduli, situate in the state of Florence, on the Appenines.

Their rule is that of St. Benedict; and their houses, by the statutes, are never to be less than five leagues from cities. The Camaldulians have not borne that title from the beginning of their order; till the close of the eleventh century they were called *Romualdins*, from the name of their founder. Till that time *Camaldulian* was a particular name for those of the desert Camaldoli; and D. Grandi observes, was not given to the whole order, in regard it was in this monastery that the order commenced, but because the regulation was best maintained here.

Guido Grandi, mathematician of the great duke of Tuscany, and a monk of this order, has published *Camaldulian Dissertations* on the origin and establishment of it.

The Camaldolites were distinguished into two classes, of which the one were COENOBITES, and the other EREMITES.

CAMALODUNUM, CAMUDOLANUM, or CAMULODUNUM, in *Ancient Geography*, a town of Albion, belonging to the Trinonantes, or Trinovantes. This town is

placed by some of our antiquaries, as Talbot, Stillingfleet, and Baxter, at Colchester; but by Camden, Horsley, and others, more conformably to the itinerary of Antonine, and with greater probability, at Malden. Dr. Gale earnestly contends for Walden. This was the capital of the powerful British king Cunobeline, and the first Roman colony in the island. Soon after the conquest of this part of the country by the Romans, a colony, consisting chiefly of the veterans of the 14th legion, was planted at Camudolanum by the emperor Claudius, A.D. 52; and by their wealth and industry, it became a place of great magnificence. But its prosperity was of no long duration; for it was quite destroyed by the Britons in their great revolt, A.D. 61. The theatre, the temple of Claudius, and the several villas in the neighbourhood, belonging to the Roman commanders, were so totally demolished by the incensed Britons, who beheld the colony as a seat of slavery, that our learned antiquarians have been much divided about the place where it was situated.

CAMAMU, RIO, in *Geography*, a large river of the Brazils, about 25 leagues to the southward of Bahia; on the banks of which are several small towns and villages, which are the best inhabited of any part of the Brazils. There are not less than 3 or 400 small vessels employed by the inhabitants to convey their commodities to Bahia and Rio de Janeiro. The Jesuits formerly carried on a great traffic with this place, and sent a large frigate loaded from these parts to Paraguay. The source of this river is in the centre of the gold mines.

CAMANA, or CAMANE, in *Ancient Geography*, a town of India, on this side of the Ganges, in the gulf of Barigazeni; supposed by some to be situate in the place of the present Cambay.

CAMANA, in *Geography*, a town of South America, and capital of the jurisdiction of Camana in the diocese of Arequipa, in Peru, situate on a river of the same name, near the South Pacific ocean. The jurisdiction is large, and contains many deserts, especially along the coast. Eastward it extends to the borders of the Cordilleras, so that the temperature of some parts is nearly the same with that of Arequipa, while others are cold; and both produce similar grain and fruits. Its principal trade consists in asses. It has silver mines near the mountains; but they are not worked. The town is 70 miles from Arequipa.

CAMANAR, a town that lies behind a ridge of rocks on the S. side of Gallipoli, on the Asiatic shore of the passage towards Constantinople and the Black sea.

CAMANBAYA, in *Botany* (Margaave and Petiver.) See TILLANDSIA *usneoides*.

CAMANTIUM, in *Ancient Geography*, the name of a town of Asia Minor, being, according to Athenæus, one of the seven towns which Cyrus conferred on his friend Clearchus.

CAMANUSALI, or ALCANA MUSALI, in *Biography*, a physician and surgeon in much estimation, who practised at Bagdad about the middle of the 13th century. He wrote a treatise on the diseases of the eyes, in which he professes to have given all that could be found in the best Arabian, Hebrew, and Chaldean writers on the subject; particularly he describes the method of curing cataracts by the use of fetons. His work was translated from the Arabic into Latin, and published at Venice in folio with the *Chirurgi de Gui de Canliac*, who frequently cites him. The title of the tract is "De Passionibus Oculorum Liber." It has been several times reprinted. Haller. Bib. Chir.

CAMARA, in *Botany* (Plumier, Dillenius, La Marck, Bosc.) See LANTANA.

CAMARA, in *Ancient Geography*, a town of the island of Crete,

Crete, situate in the N. E. part of the island. Steph. Byz. and Ptolemy.—Also, a trading town of India, on this side of the Ganges. Arrian.

CAMARACUM, now *Cambray*, in *Ancient Geography*, a town of Belgic Gaul, thought by some to be the capital of the Nervii; but M. d'Anville thought this capital to have been *Bagacum*. The two most ancient works which mention this city are the Itinerary of Antonine and the Theodosian table, whence it may be inferred, that if it existed before their time, it must have been an inconsiderable place.

CAMARADE, a companion, associate, or friend. It is a term in use among soldiers to signify a person that is in the same tent, room, or chamber with them. It is also a name given to a battery which fires at the same time with another or more batteries, at one and the same spot. Thus, for instance, in battering one of the curtains of a work, three batteries are opened against it sometimes at once, one of them a little advanced, or in the front, as it were, and another on each side of it called *camarade*.

CAMARAN, or KAMARAN, in *Geography*, an island in the Red Sea, about 30 miles in length, and 20 in breadth, distant about 8 miles from the coast of Arabia. The principal employment of the inhabitants is fishing, especially for pearls and coral. This island is distinguished by a white house, or fortress, on the west end of it, where excellent water may be procured, but no provisions, or merely such as are very bad. N. lat. $15^{\circ} 39'$, E. long. $42^{\circ} 22'$.

CAMARASA, a town of Spain, in Catalonia, on the river Segre, about 9 leagues above Balaguet.

CAMARATA, in *Ancient Geography*, a town of Africa, in Mauritania Cæsariensis, between Portus Sigenfis and Flumen Salsum. Anton. Itin.

CAMARES, in *Geography*, a town of France, in the department of Aveyron, and chief place of a canton in the district of St. Afrique; the place contains 1638, and the canton 8128 inhabitants; the territory comprehends $327\frac{1}{2}$ kilometres and 14 communes.

CAMARET, a town of France, in the department of Finistère, situate in a bay to which it gives name; 8 miles S. of Brest.

CAMARGUE, an island, or cluster of islands, in the mouth of the Rhone in France, separated by canals and fortified; the whole extent contains about 27 square leagues, and is divided into eight parishes; the land is very fertile, but the air insalubrious.

CAMARICA, a town of Spain, placed by Ptolemy in Cantabria.

CAMARINA, was formerly one of the most wealthy cities in Sicily. It stood between the rivers Oanus and Hipparis, now the Frascolari and Camarana, near the coast. Nothing now remains of this city but some ruins, and the name of Camarina, which is given by the natives to a tower and a neighbouring marsh. Camarina was founded in the 45th olympiad, destroyed by the Syracusans in the 57th, and rebuilt between the 82d and 85th olympiad. After many revolutions, it was brought under subjection by the Romans, in the first Punic war.

An old tradition reports, that Camarina was built of the clay or mud which the river Hipparis carried along with it and deposited in a lake of the same name. A passage in Pindar (Olymp. v. 29.) seems to confirm this account, which Aristarchus quotes in explaining it; and according to Bochart (Chanaan, i. 29. p. 603.), some proof is afforded by the name Camarina, as "Chamar," or "Chomar," signifies sealing-clay. However, the old commentators on Pindar have not adopted this explanation. Didymus (see Oxford edition of Pindar, 1697, fol. p. 53, &c.), and others assert,

that the poet alludes to the wood for building the city being conveyed in floats on the river Hipparis.

The *Palus Camarina* was a marsh or lake, situate near the city, which in time of drought yielded a stench that produced a pestilence; and therefore the inhabitants consulted an oracle, whether they should not drain it. Although the oracle dissuaded them, they drained it, and opened a way for their enemies to come and plunder their city. Hence arose the proverb "Ne moveas Camarinam," not to remove one evil in order to bring on a greater. This lake is now called "Lago di Camarana;" it is of a triangular form, and situate under the walls of Camarina.

CAMARINA, in *Geography*, a town of Spain in Arragon; 4 miles S. of Teruel.

CAMARINAS, a town of Spain, near the sea-coast of Galicia; 25 miles W.N.W. of Galicia.

CAMARINES, the most southern province of the island of Luzon, one of the Philippines, in which are Bondo, Passacao, Ibalon, the metropolis of the government of Catanduanes, Bulan, Serfocon, or Bagatao, where the king's ships are built, and Albai, a large bay without the strait, in which there is a high burning mountain, seen at a great distance by the ships coming from New Spain, and possessing some springs of hot water. Beyond Albai, towards the east, is the cape of Buysaygay; and coasting from hence westward, we arrive at the river Bico, which flows from a lake and runs by the city Caceres, the capital of the province. See CACERES.

CAMARINUM, or CAMERINUM, now CAMERINO, in *Ancient Geography*, a town of Italy in Umbria, on the confines of Picenum, and at some distance east of Nuceria. It was probably powerful, as the Romans, A. U. C. 144, solicited an alliance with it; they afterwards established a colony there. See CAMERINO. Strabo and Ptolemy.

CAMARIOCA, in *Geography*, a town of the island of Cuba; 15 miles E. of Havana.

CAMARIPUGUACU, in *Ichthyology*, the name under which Marcgrave, and various other old writers, describe the Brazilian species of *CLUPEA*, called by Broussonet and Gmelin *CYPRINOIDES*; see that article.

CAMARITÆ, in *Ancient Geography*, a people who inhabited the coast of the Caspian sea, on the isthmus which separates that sea from the Euxine. Dionysius Periegetes says, that they formed a numerous nation; and that they hospitably entertained Bacchus in his return from the Indian war.

CAMAROCENSIUM CIVITAS. See CAMARACUM.

CAMARON, or CAMERON, *Cape*, in *Geography*, a headland of North America, in the gulf of Honduras. N. lat. $15^{\circ} 35'$. W. long. $83^{\circ} 20'$.

CAMARONES, a town of the island of Cuba; 75 miles S.E. of Havana.

CAMARONES, or JAMOUR, a river of Africa, which rises in the country of Biafra, and passing through the territory of the Calbongos, discharges itself into the Atlantic in the gulf of Guinea. N. lat. $3^{\circ} 28'$. E. long. $11^{\circ} 30'$.

CAMARONES, *Cape*, is a headland at the mouth of this river.

CAMARONES, a river of South America, forming a bay in the Atlantic, about 30 leagues N. from Port Desire, or Deseado, and 20 from cape Blanco, which lies between them. S. lat. about $44^{\circ} 30'$. W. long. $66^{\circ} 20'$.

CAMARONES, a river of South America, on the coast of Peru, which runs into the Pacific ocean, about 36 miles S. of Arica. S. lat. about $19^{\circ} 20'$. It is 8 leagues N. from Pisagua river. There is a point or cape of the same name, rendered white by the dung of the cormorants, that resort to

it in vast numbers. The island adjoining to it is sometimes called Camaron, though its proper name is Guano.

CAMAROSIS, from *καμαρῶν*, *I arch over*, in *Architecture*, denotes an elevation with an arch or vault.

CAMAROSIS, among *Physicians*, denotes a fracture of a bone, wherein the two broken ends rise and form a kind of *camera*, or arch.

This is also called *camaroma*, and by modern Latin writers *cameratio*, sometimes *fornicatio*.—It is commonly restrained to fractures in the skull.

CAMARRA, in *Geography*, a river on the N. coast of South America, W. from the river Maya. The intervening space along the shore is covered with trees.

CAMARSEN, a town of Germany, in the Tyrolcse; 30 miles W. of Bolzano.

CAMASSEI, ANDREA, in *Biography*, a painter of history and landscape, was born at Bevagna, acquired the principles of design and colouring from Domenichino, afterwards studied in the school of Andrea Sacchi, and became eminent in his profession. He was employed at St. Peter's at Rome, and at St. John Lateran; and his works were much admired for sweetness of colouring, elegance of design, and delicacy of pencil. He died in 1648, as Sandrart says, in the bloom of life, and at a period when his reputation was daily advancing. His "Battle of Constantine and Maxentius," and "Triumph of Constantine" at St. John Lateran, are noble and grand compositions, evincing his powers of invention and correctness of execution. The picture of "Venus with the Graces," in the collection of the earl of Pembroke at Wilton, is ascribed to Camassei. Pilkington.

CAMATULLICI, in *Ancient Geography*, a people of the Maritime Alps, on the sea-coast S. W. of the Sueltri, placed by Pliny between Citharista and the Sueltri. Hardouin says, that they inhabited the diocese of Toulon.

CAMAX, in *Botany* (*καμαξ*, the prop of a vine, a stake, or pole). Schreb. gen. 365. Willden. 416. Ropourea, Aub. Guian. tab. 78. Juss. 421. La Marck Illust. Pl. 121. Class and order, *pentandria monogynia*.

Gen. Ch. *Cal.* perianth one-leafed, five-parted; segments roundish. *Cor.* one-petalled, wheel-shaped; tube very short; border five-parted; segments roundish, hairy above. *Stam.* filaments five, inserted into the corolla between the segments, hairy; anthers double. *Pist.* germ superior, roundish, hairy; style capillary; stigmas three or four, acute. *Peric.* berry egg-shaped, hairy, four-celled. *Seeds* numerous, bedded in a viscous pulp.

Eff. Ch. *Calyx* five-parted. *Corolla* wheel-shaped. *Stigmas* three or four. *Berry* four-celled, many-seeded.

Sp. C. *fraxinea*. Willd. (Ropourea guianensis, Aub. Guian. t. p. 198. tab. 78. La Marck Illust. Pl. 121.) A shrub, from 12 to 15 feet high. *Stems* three or four inches thick, simple, round, jointed. *Leaves* in whorls at each joint, declining, unequally winged; leaflets alternate, numerous, sessile, egg-shaped, acuminate, entire, green on both sides, from eight to ten inches long, and about three broad; midrib strong, throwing out on each side alternate, simple, curved nerves, the intervals between which are occupied by very fine, zig-zag veins; each of the leaflets is furnished at its base with a small spine. *Flowers* small, of a russet colour, axillary, numerous, nearly sessile; hairs of the corolla and of the germ red. *Berry* yellow, about the size of a hen's egg, full of a sweet pulp, which is eaten by the Creoles and natives of the country; one of the cells is often abortive, and as the others increase disappears. A native of Guiana, where its branches are used by the negroes for wattling their huts. The Creoles call it Bois gaulette, and the Couffaris, one of the aborigine nations, Aroupourou..

CAMB, or KAMP, in *Geography*, a river of Austria, which rises on the frontiers of Bohemia, and discharges itself into the Danube.

CAMBADAS, a town of Spain, in Galicia, near the sea-coast; 4 leagues W. of Ponte-Vedra.

CAMBADENA, in *Ancient Geography*, a country of Asia; not far from Media. One of its principal towns was Bapta, seated on a mountain, in which were a column and statue of Semiramis.

CAMBAHEE, in *Geography*, a river of America, which runs into the sea near St. Helena's sound, on the coast of South Carolina.

CAMBALA, in *Ancient Geography*, a place of Asia, in the Greater Armenia, and in the Hyperitide country, according to Strabo, who says that it had mines of gold.

CAMBALIDUS MONS, a mountain of Asia, which, according to Pliny, was a branch of mount Caucasus.

CAMBALU, a name formerly given to Pekin, the present capital of China. In 1307, it was erected by pope Clement V. into an archbishopric, which he conferred upon John de Monte Corvino, an Italian friar, who had been employed for many years in propagating the gospel in that country. Upon his death in 1330, pope John XXII. sent Nicolas of Bantra to fill the vacant see, and charged him with letters to the emperor of the Tartars, who was, at that time, in possession of the Chinese dominions.

CAMBAMBA, in *Geography*, a high mountain of Africa, giving name to the adjacent district, in the kingdom of Angola, on which is a mine of excellent silver. The Portuguese have been for a long time masters of it, and have built a strong fortress; which, on account of its vicinity to the river Coanza, carries on a great commerce of slaves.

CAMBANA. See CAMBONA.

CAMBAT, a province of Abyssinia, dismembered from it by the Gallas. It occupies that district of Africa in the southern part of Abyssinia, which lies in about N. lat. 8°, and E. long. from about 37° to 38°. It is separated from Gingiro on the west and south-west, by the river Zebbee; on the north it has the kingdom of Hadea, and other provinces of Abyssinia; on the east and south-east it has Buzamo and Alaba, and on the south Makonko. This country is frequently harassed by the Gallas; and it is said to pay some acknowledgments to the emperor of Abyssinia, which are only voluntary. But little certain is known concerning it. It is inhabited by a mixture of Christians, Mahometans, and Pagans; and abounds in various fruits.

CAMBAY, a large and beautiful city of Hindoostan, situate near the head of the gulf of the same name, upon the north bank of the river Canari, called by some the Myhie. The city is twice as large as Surat, but not nearly so populous: it is defended by a strong wall, about five miles in circumference; the streets are large, and have gates at their entrances, which are shut in the night, and there are 12 gates to the city besides those of the streets: the houses are built of stone, brick, or marble; and here are three bazars, or public markets, and four public cisterns, which are capable of supplying the whole town with water in times of the greatest drought. This city is the port of Amedabad, from which it is distant about 56 road miles. Its trade is carried on by Moorish, Armenian, and Arabian merchants, with Persia, Mocha, Diu, Achcen, Coromandel, and other places; and it was formerly very great in spice, ivory, silk, cotton cloths, and other commodities. But its commerce has declined, and is chiefly transferred to Surat, on account of the incommodiousness of the harbour, which is obstructed with sand and mud, so that in the highest tides it has not more than seven fathoms of water, and

the

the gulf is full of rocks. Cambay appears to be the Camanes of Ptolemy; although the gulf, which is now denominated from Cambay, had then its name from Barygaza, or the modern Baroach. It is distant 281 miles N. from Bombay; 1273 by Nagpour, and 1253 by Mundlah and Ougein nearly W. from Calcutta; 663 about S.W. from Delhi; and 998 N.W. from Madras. N. lat. $22^{\circ} 16' 45''$. E. long. $72^{\circ} 32' 45''$.

CAMBAYES, in *Commerce*, cotton cloths made at Bengal, Madras, and some other places on the coast of Coromandel. They are proper for the trade of Marseilles, whither the English at Madras send great numbers of them. Many are also imported into Holland.

CAMBAZA, in *Geography*, a town of Japan, in the province of Ietsingo.

CAMBE, LA, a town of France, in the department of Calvados, and district of Bayeux; four leagues W.N.W. of Bayeux.

CAMBELLO, a town of the island of Ceram, and principal market for cloves.

CAMBER-beam, in *Building*, a piece of timber cut arch-wise, or with an obtuse angle in the middle, commonly used in platforms; as church-leads, and on other occasions, where long and strong beams are required. A camber-beam is much stronger than another of the same size; since being laid with the hollow side downwards, as they usually are, it represents a kind of arch.

CAMBERED-deck, in *Ship-building*. See DECK.

CAMBERG, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and Lower Electorate; 22 miles N. from Mentz, and 30 E. from Coblenz. It is situated in a prefecture of the same name; and the circumjacent tract contains fine arable land, but principally yields a good culture of flax.

CAMBERNON, a town of France, in the department of the Channel; one league N.E. from Coutances.

CAMBERT, in *Biography*, a French opera composer, previous to Lulli, has no place assigned him here as a great musician; but on account of his being connected, in some small degree, with the history of the opera at Paris, his name will frequently occur to our readers in perusing accounts of the origin of the musical drama in France. Cambert was the first who attempted to set an opera in the French language upon the Italian model, previous to the licence which he had obtained, being transferred to Lulli, who began his opera career by composing the music for the dances. It being generally known that our monarch, Charles II. was very fond of French music and the amusements of Louis the fourteenth's court, Cambert, in losing his privilege, came to London, and was appointed master of king Charles the second's band. His opera of "Pomone," written by P. Perrin, seems to have been performed in 1672 at court, in its original language, as no record of it occurs in our dramatic writers; but, according to Giles Jacob, his "Ariadne, or the Marriage of Bacchus," translated into English, "was presented by the academy of Music, at the theatre royal, in Covent-Garden, 1674, by the gentlemen of the Academy of Music." We know of no theatre royal in Covent-Garden at this time, nor do we meet with any mention of an English academy of music at this period. It is said, in the "Histoire de la Musique," tom. i. that Cambert, who died in London in 1677, broke his heart on account of the bad success of his operas in England.

CAMBETUM, in *Ancient Geography*, a town of Spain, placed by Ptolemy in the territory of the Lubenians, in the Tarragonensis.

CAMBING, *Boorong Cambing*, or *Booring-volar*, in

Ornithology, the name by which Marsden, in his history of Sumatra, distinguishes the gigantic crane, *ardea dubia* of Gmelin, a bird of vast size that inhabits also India and Africa. It is specifically known by being of a glaucous colour above, beneath dirty white, and having the bill somewhat triangular. This is the *bargill* or *argill* of Ives.

CAMBING, or *Kamling*, in *Ichthyology*, one of the synonyms of *chaetodon teira*, according to Renard and others. See TEIRA.

CAMBINI, in *Biography*, an Italian instrumental composer, possessed of genius and fire. He is said by M. la Borde to be chiefly known to Dilettanti. We suppose the violin to be his instrument, of which he seems to know the finger-board well, and to write with fancy and facility.

CAMBIO, an Italian word which signifies *exchange*; commonly used in Provence, and in some other countries, particularly Holland.

CAMBIST, a name given in France to those who trade in notes and bills of exchange. The word cambist, though a term of antiquity, is even now a technical word, of some use among merchants, traders, and bankers. Some derive it from the Latin cambium, or rather cambio.

CAMBIUM, in *Vegetable Anatomy*, is a name that has been very happily bestowed by Duhamel and other physiologists upon the substance which is produced for the growth or repair of the vegetable body. The chief feat of the cambium in the dycotyledons, or those plants with two seminal leaves, is between the bark and the wood. In order to observe it, we should select, in the full season of vegetation, a branch of some tree, in which the bark is known to be easily separable from the wood, such as the osier, when upon detaching a portion of the bark, its inner surface, and that of the wood corresponding to it, will be found covered with a quantity of fluid which possesses more tenacity than the common lymph or sap, and resembles mucilage or fluid jelly.

The cambium is generally reputed to be either an extravasation from the surface of the wood, or that of the bark, but it is not determined from which of these parts it is derived, or whether they are not equally competent to produce it. Mirbel supposes that the cambium is furnished by the wood, and with apparent foundation, since in the monocotyledons it is deposited around the ligneous fibres.

Grew and Duhamel did not allow this substance to be an extravasated juice, but believed that it possessed organization and distinct parts, although they were so soft as to evade all means of detection. Without deciding upon this opinion, we must admit that the cambium is not a simple fluid, but must have received some modification to fit it for the important changes it is designed to undergo. As the season advances, this substance (when situated under the bark,) acquires solidity and visible organization, and is ultimately converted into the new layers of wood and bark, which are annually deposited upon dycotyledons. See BARK, CORTICAL LAYERS, LIBER, and WOOD.

The gradual disappearance of the pith in many trees depends upon the formation of the cambium, or organizing substance within the medullary canal. This produces an internal liber, which is by degrees transformed into wood, in the same manner as the external liber gives origin to the external woody layers, except that in the former, the increase is outwards, while in the latter, it is towards the center. See PITH, and MEDULLARY CANAL.

As the mode of growth in plants with one seminal leaf differs so materially from that of the dycotyledons, the cambium in them likewise holds a different situation. Instead of being deposited near the surface of the plant, it surrounds the ligneous fibres which occupy the interior, where it is

converted into the cellular and tubular texture; the latter forms at first a very porous wood which insensibly contracts, elongates, and is transformed into perfect wood, during which process it separates from the parenchyma, and leaves a lacuna which is soon filled with new cambium. See *MO-COTYLEDON WOOD*.

All new formed parts, such as buds, seeds, &c. may be said to exist at one period as cambium; even the hardest stone fruit, when first observed, is a tender vegetable jelly, in which no fibres, cells, or any distinction of parts, can be discovered.

When wounds are inflicted upon plants, their reunion is accomplished by means of the cambium, and from its organization arise the nodes or swellings, which are the consequence of engrafting trees. If any injury to a vegetable be accompanied by destruction of parts, the reparation is commenced by a deposition of cambium, and continued by repeated effusions of the same substance until the reproduction is complete. See *WOUNDS and DISEASES of plants*, and *INGRAFTING*.

The analogy between the vegetable cambium and the coagulable lymph of animals is so palpable, that it is hardly necessary to point it out. These substances equally afford the matrix in which organic structure is begun, and constitute the most essential and important materials in the animal and vegetable systems.

CAMBLET, or *CHAMBLET*, in *Commerce*, a stuff sometimes of wool, sometimes silk, and sometimes hair, especially that of goats, with wool or silk: in some, the warp is silk and wool twisted together, and the woof hair.

The true or oriental camblet is made of the pure hair of a sort of goat, frequent about Angora, and which makes the riches of that city, all the inhabitants whereof are employed in the manufacture and commerce of camblets. It is certain we find mention in middle age writers of stuffs made of camel's hair, under the denominations of *cameletum* and *camelinum*, whence probably the origin of the term; but these are represented as strangely coarse, rough and prickly, and seem to have been chiefly used among the monks by way of mortification, as the hair-shirt of later times. Du Cange, *Gloss. Lat.*

We have no camblets made in Europe of the goats hair alone; even at Brussels they find it necessary to add a mixture of woollen thread.

England, France, Holland, and Flanders, are the chief places of this manufacture. Brussels exceeds them all in the beauty and quality of its camblets; those of England have been reputed the second.

CAMBLETS, figured, are those of one colour, whereon are stamped various figures, flowers, foliages, &c. by means of hot irons, which are a kind of moulds, passed together with the stuff under a press. These are chiefly brought from Amiens and Flanders: the commerce of these was anciently much more considerable than at present.

CAMBLETS, water, those which, after weaving, receive certain preparation with water; and are afterwards passed under a hot-press, which gives them a smoothness and lustre.

CAMBLETS, waved, are those whereon waves are impressed, as on tabbies; by means of a calendar, under which they are passed and repassed several times.

The manufacturers, &c. of camblets, are to take care they do not acquire any false and needless plaits; it being almost impossible to get them out again. This is notorious, even to a proverb: we say, a person is like camblet, he has taken his plait.

CAMBNITES LAPIS, in *Mineralogy*, a name given by the

Writers of the Middle Ages to a stone, of which they record virtues which appear to favour too much of imaginary ones, such as the curing of the dropsy by being tied to the arm: it seems to have been only a cloudy and less valuable kind of brown crystal.

CAMBODUNUM, or *CAMPODUNUM*, in *Ancient Geography*, a town of Vindeliçia, 57 miles from Augusta Vindelicum, now Kempten, in Suabia. Anton. Itin.

CAMBODUNUM, a British station in the Itinerary between Calcaria or Tadcaster, and Manucium or Manchester. Dr. Gale and Mr. Baxter place it at Almonbury, where some Roman antiquities have been found; but Mr. Horsley thinks it more probable that it was near Gretland.

CAMBOGE, *CAMBODIA*, or *LEVEK*, in *Geography*, the capital of Camboja, situated on a river of the same name. It consists of one street, and a temple. The beauty of this temple is much extolled. It is supported by wooden pillars, varnished with black; the foliages and reliefs are gilded: the pavement is curious and valuable, and mats are laid over it to preserve it. The priests who serve in it hold the first rank in the state. At a small distance from this capital are seen the ruins of an ancient city, built with stone, the architecture of which somewhat resembles the European; and the adjacent lands are marked with furrows of former cultivation. No tradition concerning this city subsists among the present possessors of the country. N. lat. 12° 40'. E. long. 104° 48'.

CAMBOGE, *CAMBOJA*, *MECON*, or *MAYKAUNG*, names given to a large river which traverses the whole country of Camboja. It rises far north, and in the former part of its course, bears the name of Mecon; in its further progress it passes by the towns of Lan-tchang, Tiem, and Columpé; at a small distance north of the capital it divides into three branches, two of which unite between the city and the sea, and form the river, which assumes the name of Camboje; the other branch is denominated Oubequame. Both discharge themselves into the sea by separate mouths; the mouth of the Camboje being in N. lat. 10° 20'; and that of the other in about N. lat. 10°.

CAMBOGIA, in *Botany*. See *GARCINIA*.

CAMBOJA, *CAMBODIA*, *CAMBOYA*, or *CAMBOGE*, in *Geography*, a country of Asia, bounded on the north by Laos, on the east by Cochinchina and Ciampa, on the west by Siam and its gulf, and on the south by part of the said gulf, and the Indian Ocean; and estimated at about 135 leagues in length, and 50 in breadth. This country, like Siam, is enclosed by mountains on the east and west; and it is fertilized by a large river, called Mecon, near its source, and Cambodia or Camboje near its æstuary, and by some, very absurdly, the Japanese river. This river, it is said, begins to inundate the country in June. Near its mouth it is full of low isles and sand-banks, which impede the navigation, and it has no port or town. Sir George Staunton (*Embassy to China*, vol. i. p. 320.) informs us, on the authority of a manuscript account of a voyage to this country, made in 1778, that the point of Cambodia, as well as the whole coast from thence to the western branch of the great Cambodia river, is covered with under-wood, and exceedingly low. The sea is so shallow, that at the distance of five or six miles from the shore, the water was seldom deeper than four fathoms; and no vessel much larger than a boat could approach within a couple of miles. The air is so hot that the inhabitants are under the necessity of residing on the banks of the rivers and lakes, where they are tormented by muskettoes. The soil is fertile, and produces abundance of corn, rice, excellent legumes, sugar, indigo, opium, camphor, and various medicinal drugs. The most peculiar product

duct is the Camboge gum, which yields a fine yellow tint. Ivory also, and silk, are very plentiful, and of little value. The gold of this country is said to be very pure; and it furnishes amethysts, hyacinths, rubies, topazes, and other precious stones. Cattle, particularly of the cow-kind, are numerous and cheap. Elephants, lions, tigers, and almost all the animals of the deserts of Africa, are found in Cambodia. It has several precious woods, among which are the sandal and eagle-wood, and a particular tree, in the juice of which they dip their arrows; and it is said, that though a wound from one of the arrows proves fatal, the juice itself may be drank without danger. The country, though fertile, is very thinly peopled, inasmuch, that the king is hardly able to assemble 30,000 men; and its trade is inconsiderable. The inhabitants are Japanese, Chinese, and Malays, together with some Portuguese, who live without priests, and have intermarried with the natives. The men are generally well made, of a dark yellow complexion, with long black hair; their dress is a long and loose robe; but the dress of the women, who are handsome, but not very modest, is shorter and closer. Their religion is idolatry. They manufacture very fine cloth, and the needle-work of the females is much admired.

CAMBONA, a small island in the Indian Sea, near the south coast of the island of Celebes. S. lat. $5^{\circ} 22'$. E. long. $125^{\circ} 45'$.

CAMBONES, a town of France, in the department of the Tarn, 7 miles E. of Castres.

CAMBONUM, in *Ancient Geography*, a place of Gaul, to the left of the Rhine, in the route which passes from Dea Vocontionum (Die), and Lucus Augusti towards Vapincum (Gap), in going by Mons Seleucus.

CAMBORI, in *Geography*, a town of Asia, in the kingdom of Siam, on the frontiers of Pegu, seated on a small river which runs into the gulf of Siam.

CAMBORICUM, or CAMBORITUM, in *Ancient Geography*, a British station in the fifth route of Antonine's Itinerary from London to Lugovallium or Carlisle, between Icanos and Duroliponte. All our antiquaries, except Mr. Horsley, fix Camboricum near Cambridge, at a place called by Bede, Grantchester, and derive its name from *Cam*, crooked, and *brit*, a ford. Those antiquaries who place Camboricum at Cambridge, fix Duroliponte at Godmanchester.

CAMBRA, in *Geography*, a small town of Portugal, in Beira.

CAMBRASINES, in *Commerce*, fine linen made in Egypt, of which there is a considerable trade at Cairo, Alexandria, and Rosetta or Raschit. They are called cambra-sines, from their resemblance to cambrics.

CAMBRAY, in *Geography*, anciently *Camaracum*, a city of France, and principal place of a district, in the department of the North, seated on the Scheldt, which divides it into the eastern and western parts, and fills its ditches with water. Before the revolution, it was the capital of Cambresis, in the Low Countries, and the see of an archbishop, established in 1559. The archbishop styled himself Prince of the Holy Roman Empire, and Count of Cambresis, and he was also lord of the city. It is well fortified, being defended by a strong citadel on the Scheldt, and a fort; and as the land is low on that side of the river, the adjacent parts may be laid under water by means of sluices. This city is large and tolerably handsome; its streets are spacious; the place or square for arms is so extensive as to be capable of receiving the whole garrison in order of battle. It has two collegiate churches, exclusively of the cathedral, which is dedicated to the virgin Mary, and one of the finest in

Europe. The steeple is high, and from the top of it, commands a view of the whole city. It contains ten parish churches, three abbeys, two convents, two hospitals, and several religious houses. Its principal manufactures are lace, soap, and leather; and particularly the fine linen, hence called *cambric*. The eastern division contains 6,600, and the western 7,200 inhabitants; the former canton contains 14,391, and the latter 14,443 inhabitants; the whole territory comprehends $147\frac{1}{2}$ kilometres, and 31 communes. Cambray is an ancient city, and was formerly imperial. It has been, on a variety of occasions, the subject of contest between the emperors, the kings of France, and the earls of Flanders. In 1544 it was taken by the emperor Charles V. It was afterwards given to John of Montluc, by Henry III. of France, but besieged by the Spaniards in 1596, when the inhabitants compelled the governor to surrender. Ever since it continued under the dominion of the house of Austria till 1677, when it came into the possession of France. In August 1793, this city was invested and summoned to surrender by the Austrian general De Boros; the French general Decay returned for answer, that he did not understand surrendering, but he knew how to fight. In April, 1794, the French were defeated at Caesar's camp, in the neighbourhood, by the allied army under the command of the duke of York, with the loss of 1200 men, and three pieces of cannon; and the next day they left 1200 men dead on the field of battle, with the loss of their general, Chapuy, 350 officers and privates taken prisoners, and 22 pieces of cannon. N. lat. $50^{\circ} 10' 32''$. E. long. $3^{\circ} 13' 41''$.

The league of Cambray, in 1508, was the most singular event that occurs in the history of Europe. It was a confederacy, instigated by pope Julius II. and which gained the concurrence of the emperor Maximilian I., of Louis XII. of France, by the suggestion of cardinal d'Amboise, and of Ferdinand king of Spain, for the final overthrow of the republic of Venice. This league originated in resentment, and was diametrically opposite to the true interest of every one of the contracting powers. The republic of Venice had before this time acquired great power; but whatever were the means by which it had become thus powerful, it was now the bulwark of Italy; it prevented the pope from drawing the emperor or the king of the Romans, as he was then called, into Lombardy, against the French; it moderated the views of king Louis, and hindered him from extending his conquests; it kept the pope from being reduced to a state of dependency; and it preserved to Ferdinand the catholic the kingdom of Naples. Although it might have been the interest of each of these potentates, separately, to recover, if possible, what had been taken from them by the republic; yet, to oblige her to refund all her conquests was to reduce a power of which they were all afraid, and thus to open a source of perpetual wars among themselves. However, the league was formed; consisting of a variety of articles, advantageous to the several contracting parties, and threatening destruction to Venice. The execution of it was attended with all the success that could be expected; for the emperor and the king of France wrested from the Venetians almost all the cities which they possessed in Lombardy; nor was the pope remiss in seizing all that lay convenient for his purpose. The Venetians, indeed, thought themselves so little able to withstand this powerful and formidable alliance, that they abandoned all the territories on the continent, after having lost the famous battle of Ghiera d'Adda, in which their whole infantry was cut to pieces. However, after many humiliations and disasters, they preserved their capital; and having either brought over, or bought over, the pope,

pope, the rest of the confederacy was disjointed. The measures of the French and Germans, who were bent upon her total ruin, were traversed by the king of Aragon and the pope, who would by no means concur in the utter destruction of the only power which had hitherto hindered these nations from subduing all Italy. The republic soon recovered a great part of her former territories; though she was obliged to surrender to the pope Ravenna; to Spain, the five towns which she had till this time possessed in Calabria; and to the emperor, Trieste and Friuli.

CAMBREMER, a town of France, in the department of the Calvades, and chief place of a canton, in the district of Pont-l'Evêque; 5 leagues E. of Caen. The place contains 1200, and the canton 10,118 inhabitants; the territory includes 195 kilometres, and 36 communes.

CAMBRENSIS, GIRALDUS, in *Biography*, arch-deacon, and afterwards, bishop of St. David's, was born about the middle of the 12th century, and died after the year 1210. See **GIRALDUS**.

The account which this ancient prelate has given, in his description of Wales, concerning the marvellous power which the Cambro-Britons and the Northumbrians had, of singing in parts spontaneously, at a time when counterpoint was unknown in the rest of the world, not only merits notice here, but some discussion. See **CAMBRO-BRITISH AND NATIONAL MUSIC**. Many ecclesiastical historians tell us that the organ was first admitted into the church at Rome by pope Vitalian, 666, the same pontiff who two years after sent singers into Kent, to finish the work which Austin, the first Roman missionary, had begun. In 680, according to Bede, John, the prætor of St. Peter's in Rome, was sent over by pope Agatho to instruct the monks of Weremouth in the manner of performing the ritual, who opened schools for teaching music in other places of the kingdom of Northumberland. This may reconcile to probability some part of the following account, which Giraldus Cambrensis gives of the peculiar manner of singing that was practised by the Welch, and the inhabitants of the north of England, about the end of the twelfth century.

"The Britons," says he, "do not sing in unison, like the inhabitants of other countries; but in many different parts. So that when a company of singers among the common people meet to sing, as is usual in this country, as many different parts are heard as there are performers, who all at length unite in consonance, with organic sweetness. 'In unam denique sub B mollis dulcedine blandâ consonantiam et organicam convenientia melodiam.' In the northern parts of Great Britain, beyond the Humber, on the borders of Yorkshire, the inhabitants use the same kind of symphonious harmony; except that they only sing in two parts, the one murmuring in the base, and the other warbling in the acute or treble. Nor do these two nations practise this kind of singing so much by art as habit, which has rendered it so natural to them, that neither in Wales, where they sing in many parts, nor in the north of England, where they sing in two parts, is a simple melody ever well sung. And, what is still more wonderful, their children, as soon as they attempt using their voices, sing in the same manner. But as not all the English sing in this manner, but those only of the north, I believe they had this art at first, like their language, from the Danes and Norwegians, who used frequently to invade and to occupy, for a long time together, those parts of the island."

This extraordinary passage requires a comment. And first, it may be necessary, before we reason upon the circumstances it contains, to be certain of their authenticity. Giraldus Cambrensis is indeed an author who has been often

supposed inaccurate and fabulous. "Giraldus Cambrensis deserves no manner of regard or credit to be given him; and his Chronicle is the most partial representation of the Irish history that ever was imposed on any nation in the world. He has endeavoured to make the venerable antiquities of the island a mere fable; and given occasion to the historians that come after him, to abuse the world with the same fictitious relations." Keating, part i. p. 13. Dr. Nicholson, Bishop of Derry's, Irish Historical Library, 1st ed. Dublin, 1724. The glaring improbabilities in the above account, with the manifest ignorance of the subject in question, by no means contribute to augment his credibility. For whoever is acquainted with the laws of counterpoint, or with the first difficulties attending the practice of singing in parts, can have no exalted idea of the harmony of an untaught crowd, *turbæ canentium*, or suppose it to be much better than the dissonant pæans of a good-humoured mob; in which the parts would be as various as the pitch of voices of which their chorus was composed. But how all these united at last in the consonance of organic melody, and the soft sweetness of *B mollis*, will long remain an impenetrable secret. If by *melodia organica* he meant organized, or harmonized, melody, we may suppose that the Cambro-Britons, in the time of Giraldus Cambrensis, had acquired some knowledge in diaphonics, or discant; which according to John of Salisbury, an elder writer, was practised to great excess in the 12th century. With respect to what he asserts of the people in Northumberland singing in two parts, it is more reconcileable to probability, from the circumstances just mentioned, of the cultivation of music in that part of the world under Roman masters, who may probably have first brought over the art of discant, or double singing, which the newly invented organ had suggested, by the facility it afforded of founding two or more notes at a time; which art, when practised by voices, was thence called *organum*, *organizare*. But as to what Giraldus says of children naturally singing in this manner as soon as they were out of the cradle, the reader will afford it what degree of weight he pleases; for our own part, we must own that it is not yet admitted into our musical creed.

CAMBRESIS, in *Geography*, a province of France in the Low Countries, before the revolution, bounded on the north and east by Hainault, on the south by Picardy, and on the west by Artois. The length is about 10 French leagues, and its breadth from 5 to 6, and in some parts from 2 to 3. It is fruitful and populous, and watered by the Scheldt, Seille, and Sambre. The principal towns are Cambrai, the capital, Chateau-Cambresis, Crevecoeur, Valincourt, and Vaucelles. Its inhabitants are laborious and lively, and addicted to the arts. Its commerce consists chiefly in grain, sheep, wool, and linen. Its pastures are excellent, particularly for horses and sheep.

CAMBRETONIUM, in *Ancient Geography*, a British station in the 9th route of Antonine's Itinerary, 15 miles from Ansa or Witham in Essex. Mr. Camden and Dr. Gale fix this station at Brentonham, on the river Breton; but Mr. Horsley thinks that the distance suits better with Stratford, near the confluence of the Breton and the Stowr.

CAMBRIA, a name given to the province of Wales before the time of Cæsar's invasion, and retained by it till about the close of the 6th century, when it took the appellation of Wales; and when the inhabitants, likewise, with their ancient situation, lost the title of Britons, and became distinguished by the name of Welsh. See **WALES**.

CAMBRIC, in *Commerce*, a species of linen made of flax, very fine and white; the name of which was originally derived

sived from the city of Cambray, where they were first manufactured. They are now made at other places in France.

The manufacture of cambrics hath long since proved of extraordinary advantage to France. For many years it appeared that England did not in this article contribute less than 200,000*l.* per annum to the interest of France. This proved motive sufficient to induce the parliament of Great Britain to enact many salutary laws to prevent this great loss of our wealth. See 18 Geo. II. c. 36. and 21 Geo. II. c. 26. See also stat. 32 Geo. II. c. 32. and 4 Geo. III. c. 37. which regulates the cambric manufactory, not long since introduced into Winchelsea in Sussex; but very soon abolished. The cambrics now allowed in this country are chiefly manufactured in Scotland and Ireland. Any person convicted of wearing, selling (except for exportation), or making up for hire any cambric or French lawns, are liable to a penalty of 5*l.* by the two first statutes cited as above. The above cited statute, 4 Geo. III. c. 37. establishes the corporation of the English linen company for making cambrics and lawns, and enacts, that, whenever there shall be a manufactory of this kind, the commissioners of excise shall appoint the supervisor, or other officer, to seal the same; for which purpose notice shall be given by the manufacturer, before the piece is taken out of the loom, under penalty of 5*l.* and forfeiture of every such piece. This piece shall be marked and numbered, on pain of 10*l.*; and an officer marking any piece not made in England, or after it is taken out of the looms, shall forfeit 50*l.* and his office. Attempt to bribe an officer incurs a penalty of 50*l.*, and the officer accepting it forfeits 100*l.* and incurs the punishment of the pillory. Cambrics and lawns, made in England, and found unstamped, shall be forfeited, seized, and sold; and any person exposing such to sale, or having them in his custody for that purpose, shall forfeit 200*l.*; which goods shall be exported, and not relanded. To counterfeit the seal, or import any foreign cambrics or lawns with a counterfeit mark, or expose the same to sale, knowing the stamp to be counterfeited, is felony without benefit of clergy.

CAMBRIDGE, in *Geography*, is a large, and the principal town in a county of the same name in England. It is particularly noted in the annals of literature and science, for its university, which has been honoured with the residence of many persons of eminent and highly illustrious character, and provided for them the means of instruction. Concerning the priority of origin, and establishment, of this, and the sister university at Oxford, there has been much controversy with partial antiquaries. The original foundation of this town and seminary is involved in fabulous obscurity; and the stories that have been propagated by some of the monkish writers confute themselves by their own absurdity. Without repeating any of these fables, or tracing up the annals of Cambridge anterior to the Roman colonization of Britain, we will endeavour to elucidate its history briefly from that period. "The site of the Roman *Granta*," observes Dr. Stukeley, "is very traceable on the side of Cambridge towards the castle, on the north-west side of the river, of an irregular figure containing 30 acres, surrounded by a deep ditch, great part of which remains on the south-west, and in the grounds behind Magdalen college." Roman bricks, coins, urns, and pateræ have been found near this spot, and in the vicinity. The villages of Chesterton and Grantchester, in the neighbourhood of Cambridge, have been considered by some antiquaries as occupying the sites of Roman stations or camps; and as preserving evidences of that in their present appellations. Other memorials of the Ro-

mans have been found in the military ways, or roads which diverged from the station of *Granta*.

During the Anglo-Saxon dynasties, the annals of Cambridge record but few events, and those are merely of battles, sieges, and other military operations. The university, or rather a kind of academical institution, appears to have been first founded early in the seventh century, by Sigebert, king of East-Anglia. How long this endured we are not informed; but as Alfred complained that he could not find teachers when he had youth and leisure to be instructed, we may fairly presume that there were no public seminaries at that time. The merit of restoring, or probably of founding the real university belonged to Edward the Elder, son of Alfred the Great, who appears from the chronicle of Hyde-abbey, to have erected "halls for the students, and chairs and seats for the doctors, at his own charge." He also appointed professors, and adopted other necessary measures which seemed to secure the stability of the institution. In the year 1010 the town was fired, and plundered by the marauding Danes, who committed repeated depredations in this part of the island. At the time of the domesday survey, in the reign of William the Conqueror, it contained 373 houses, 27 of which were shortly afterwards removed to make room for the *castle* erected by the Conqueror; or rather, as Fuller observes, "re-edified." In this fortress he soon afterwards received the submission of the monks of Ely, whose resistance to his power appears to have been the principal inducement for erecting it. In the reign of William Rufus, the town and county of Cambridge were ravaged with fire and sword by Roger de Montgomery, in revenge for an affront given him by the king. The university was therefore for some time abandoned, but Henry I. induced the wandering students to return, by investing the town with many valuable privileges. He exempted it from the power of the Sheriff in the year 1101, and made it a corporation on payment to the exchequer of 100 marks annually. Josfrid, abbot of Croyland, sent four monks to Cottenham near Cambridge, from which place they daily repaired, according to Peter Blesensis, to the university town, "and having hired a public barn, made open profession of their sciences, and soon collected a great number of scholars." These continued to increase, and the place progressively acquired celebrity till 1174, when nearly the whole of the town was consumed by a fire "so merciless," says Fuller, "that it only stopt for want of fuel to feed its fury." Most of the churches, as well as the houses, appear to have been constructed with wood at this period. Tournaments were frequently held at Cambridge in the 13th century, and the concourse of people was so great, that the students were much inconvenienced both in board and lodging. To remove this impediment to learning, Henry the Third forbade any tournament to be kept within five miles of the town. In examining the local annals of Cambridge, we find that frequent disputes and altercations, often ending in battles, arose between the townsmen, and those persons connected with the university. In 1281, a particular instance of this kind occurred. The towns-people assembled at their hall, and having chosen John Grantceter, for their leader, compelled him to swear that he would execute whatever the bailiff and burgeses should command. Proceeding to Corpus Christi college, they broke open the doors, and carried away all the charters, and other documents; they next went to the house of the chancellor, whom they compelled, as well as all other persons of the university, to renounce the privileges that had ever been granted to them, and also deliver up all the letters-patent then in their possession. After this

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they broke open the university chest, which was kept in St. Mary's church, and taking out all the records, burnt them in the market-place, together with the papers they had previously collected. Numerous other acts of violence were committed. At length Henry Spencer, bishop of Norwich, coming here with some soldiers, suppressed these daring tumults, and punished the principal leaders; the mayor was deprived of his office, and the liberties of the town were declared forfeited, and bestowed on the vice-chancellor, in whom they remained till the reign of Henry the Eighth, when the corporation was restored, but several of its former privileges were retained by the university.

An insurrection breaking out in the eastern counties in the time of Richard the Second, he summoned a parliament here in 1383. In this assembly a statute was made against *wanderers*, or students of either university, who traversed the country *begging alms* without licence, which at that time was a common practice. On the 2d of May 1534, the university renounced the supremacy of the Pope, and the next year surrendered all its charters, statutes, and papistical muniments into the hands of Lord Cromwell. These records were, however, soon afterwards restored, and the university reinstated in the full exercise of its privileges. From the death of Henry the Eighth, till the accession of Elizabeth, the university and town were in continued commotion, and various acts of hostility were committed by the opposite parties. The latter monarch, however, restored peace to the university, where she resided five days in the early part of her reign. Here she was entertained with various dramatic exhibitions, besides orations, disputations, and other academical exercises. On leaving the town, the queen in an elegant Latin speech recommended the members of the university to make the result of their studies public.

In 1630, Cambridge was visited by a dreadful plague, which occasioned the business of the university to be suspended, and all the students had leave to retire to their respective homes. Between three and four hundred persons fell victims to this direful malady. The assizes were at this time removed to Royston. During the unhappy warfare between Charles I. and his parliament, the persons of the university very early declared themselves in favour of the king, and as a pledge of loyalty, sent their plate to be converted into money for his use, a few days before the erection of his standard at Nottingham. This measure provoked the Cromwellian parliament, whose forces laid the town under repeated contribution, and the officers and students of the university were compelled to seek safety in flight. Soon after the restoration, tranquillity was again restored; and since that period, various useful and important plans to promote the prosperity of the town, and the advantages of learning, have been progressively established. The castle and fortifications have gradually crumbled in the course of time, and the university has continued to increase its literary reputation from that epoch.

The extent of Cambridge occupies a space of ground which measures about one mile from north to south, and half a mile from east to west. The streets are in general narrow and winding, and the houses ill-built, and too much crowded together. The town was first paved in the reign of Henry VIII. who, in his 36th year, caused it to be enacted by Parliament, that all persons who had any houses, lands, &c. in Cambridge, bordering on the highways, should pave them to the middle of the said ways, "in length as their grounds do extend," and also keep them in repair, under the penalty of sixpence for every square yard. In 1787, an act was passed "for the better paving, cleaning,

and lighting the town, and widening the streets, lanes, and other passages." Many improvements in each of these respects have since been effected. The population compared with the limited extent of the town is very great; for besides the persons residing in the colleges, the number of inhabitants returned under the late act was 9273; of houses 1733. The trade carried on at Cambridge is not inconsiderable; besides that which is either immediately or remotely connected with the university. The corporation consists of a mayor, high steward, recorder, twelve aldermen, twenty four common council-men, four bailiffs, a town clerk, and other officers. The mayor, on the day of his election, has the privilege of bestowing the freedom on any one person he may think proper. The choice of representatives in Parliament is vested in the mayor, bailiffs and freemen not receiving alms: the voters are about 200.

The *Castle* of Cambridge, of which there are scarcely any remains, was raised soon after the conquest; for 27 houses are said in the Conqueror's survey to have been levelled for the purpose of erecting it. On the site of this ancient fortress, a new, large county gaol was lately built, upon a novel plan. Near this is a large conical mount, the keep of the ancient Norman castle. This occupies the highest ground in the town, and its summit commands a very extensive tract of flat country. In the market place is a conduit, which was erected, and the water brought to the town by Thomas Hobson the celebrated carrier, in 1614. Near it are the shire hall, and the town hall, two large buildings.

PUBLIC BUILDINGS. Cambridge contains 14 parishes, 13 of which are provided with their respective churches. Two only of these are, however, entitled to public notice, the others being mostly small, incongruous, and very inelegant buildings. Among the most ancient structures in the town, and certainly the most curious specimen of architectural antiquity it possesses, is the *Round Church*, or church of the *Holy Sepulchre*. This is one of the very few imitations which now remain in England, of the church of the Holy Sepulchre at Jerusalem. The original building was perfectly circular, having its roof supported by eight large columns, between which and the outward wall, is a circular aisle. The entrance door-way has a semi-circular arch of three different mouldings, which spring from capitals and columns of that style of architecture usually called Saxon. Indeed the whole structure was originally of this style, but has been altered at later periods; and at the time of such alterations, the architects appear to have adopted the then prevailing mode of building. Mr. Essex (in vol. vi. of the *Archæologia*) affirms that it was built by the knights templars, or by some persons concerned in the croisades, in the reign of Henry the First, or between the time of the first and second crusade. It is certainly the oldest church of the kind in England, though the temple church in London, and the round church in Northampton, are constructed nearly similar in their respective ground plans; though their arches, columns, and ornaments, are very dissimilar.

The university church, called *Great St. Mary's*, though a large spacious building, is not remarkable either for its beauty, or uniformity of architecture. It was built by contribution, and though begun in the year 1478, it was not completely finished till 1608. In the years 1783 and 1784, about 1500*l.* were expended in "repairing and beautifying this church;" but the alterations not being directed by taste, have neither beauty nor science to recommend them to our approbation. The other churches of Cambridge are mostly built with brick walls, which are plastered and whitewashed.

The

The most conspicuous and most celebrated building of the university is *King's College chapel*, which, for elegance and beauty of parts, for grandeur of effect, and scientific construction, is justly admired by all artists, connoisseurs, and architects. The design of this structure is at once bold, chaste, and profound; and its exterior and interior effects are grand and impressive. It consists of only one space or aisle, which measures 287 feet in length, by 44 feet in width, and 93 feet in height. This spacious apartment is surrounded with various attractive beauties; and the sculptor, painter, glazier, and architect, seem to emulate each other in exciting admiration. The whole interior superficies is covered with numerous sculptured ornaments, among which the arms and cognizances of the houses of York and Lancaster are most prevalent. The rose, portcullis, fleur de lis, with shields of arms, are stuck all over the walls. These are carved in high alto-relievo, and are executed with great skill and taste. Some of the supporters display the hand of a first-rate statuary, and though cut in stone, are equal in contour, expression, and character, to almost any marble sculpture. A wooden screen separates the ante-chapel from the choir. The latter has two rows of stalls of carved wood on each side, and on the pannels at the back part of the upper rows, are carved the arms of all the English kings from Henry the Fifth to James the First. The whole chapel is lighted by 26 large windows, beside some smaller ones, which communicate to different lateral chapels, or chantries. These occupy the spaces between the buttresses, and are now appropriated to libraries, and to other purposes. All the upper windows, except that at the west end, are filled with painted glass, which, for the style of drawing, colouring, composition, expression, &c. manifest great talents in the artists who executed it. The groining and construction of the roof of this fabric are regarded with admiration and astonishment. In forming the arch, and disposing the materials, the architect has displayed such a profound knowledge of geometrical principles, as to confound almost every other artist who has since examined his workmanship. It is traditionally reported that Sir Christopher Wren annually visited this pile, to view the roof; and the same tradition has given currency to an absurd remark, which that great architect is said to have made. This roof was executed by John Wastell, and Henry Semerick, who by an indenture still extant agree "to make, and sett up, at their own costs and charges, a good, sure, and sufficient wawte, for the grete church there, to be workmanly wrought, made and sett up after the best handlyng and forme of good workmanship according to a plat thereof made and signed with the hands of the lords executors to the kyng of most famous memorye Henry the VII, &c." They also agree to provide stone, and every other requisite for the said work, to finish it in three years, and to receive 1200*l.* for their whole labour and materials.

This magnificent fabric was begun by king Henry VI. who left particular directions in his will, and bequeathed ample endowments for the completion of the chapel and the whole college buildings, &c. But the former was not completed till the reign of Henry VIII. and the latter have never been finished. It appears that only a part of the walls at the east end of the chapel and to a certain height on the north and south sides, were raised during the lifetime of the founder. The building was a little advanced by Richard III.; and Henry VII. made much greater progress in the work. It advanced with rapidity during the reign of Henry VIII. and the case or shell of the building was finished in 1515. For further particulars relating to the history and character

of this structure, see Malden's Account of King's College Chapel, 8vo.

Near the north side of this chapel is the *Senate House*, which was built by Gibbs the architect from a design by sir James Burroughs, who was master of Caius College. It was begun in the year 1722, and cost nearly 20,000*l.* in completing; about 11,000*l.* of which were contributed by individual benefactors. It is built entirely of Portland stone, and adorned with pilasters, frieze, balustrades, &c. in the Corinthian style of architecture. In the middle, both of the south and east fronts, is a grand triangular pediment, supported by four fluted columns of the same order. The interior is occupied by one large room, where all the public business of the university is transacted. It measures 101 feet long by 42 feet broad, and 32 feet high. Near this building is the *Public Library*, which consists of four rooms on the upper floor; the ground floor, consisting of three sides of a square, being occupied by the *Schools*. The library contains many curious, valuable and interesting objects; among which is an antique statue of Ceres brought from the temple at Eleusis, the Cippus from the tomb of Euclid, the Beza MS.; and numerous other rarities.

Most of the other public buildings being connected with the colleges and halls, we shall notice the most interesting under their respective establishments, and shall arrange these in the chronological order of their foundations. Previous to the erection of colleges, the students resided in hostels, or inns, which were provided by the townsmen for their reception. All the charges of education and maintenance were paid by themselves; though the scholastic degrees and government were, according to the report given of the ancient statutes, nearly the same as at present. In the time of Richard II. the number of hostels at Cambridge amounted to 16. The extravagant terms of landlords' charges probably gave rise to the colleges; as it is recorded that they were very extortionate in their demands.

COLLEGES, &c.—The university buildings consist of twelve colleges and four halls, which last possess the same privileges as the former. Each of these contains apartments for the students and fellows, a master's lodge, a chapel, a library, a hall, and a combination room. In the following table is recorded, in chronological order, the name and the time of founding each of these institutions.

1. Peter House College, founded	- - -	1257
2. Clare Hall,	- - -	1326
This being burnt, was rebuilt in	- - -	1344
Again completely rebuilt in	- - -	1638
3. Pembroke Hall,	- - -	1343
4. Gonville and Caius College, built by E. Gonville,	- - -	1348
Enlarged by Dr. Caius,	- - -	1557
5. Corpus Christi, or Bene't College,	- - -	1344
Augmented in revenues, &c.	- - -	1356
6. Trinity Hall,	- - -	1350
7. King's College,	- - -	1441
8. Queen's College,	- - -	1448
9. Catharine Hall,	- - -	1475
10. Jesus College,	- - -	1495
11. Christ's College,	- - -	1505
12. St. John's College,	- - -	1509
13. Magdalen College,	- - -	1519
14. Trinity College,	- - -	1546
15. Emanuel College,	- - -	1584
16. Sidney Sussex College	- - -	1598

In addition to these, a new college, upon a large and grand scale, is proposed and intended to be erected in pursuance of the will of sir George Downing. This gentleman,

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man, in the year 1717, devised various estates, &c. in failure of certain issue, for this purpose. The validity of the will was disputed by some of his relatives, but after many years' litigation, was finally settled in 1800, and the master, professors, and three of the fellows are already appointed: thirteen other fellows are to be chosen when the college is built. We shall proceed to notice a few particulars relating to each of the above-named foundations.

St. Peter's College, usually called Peter-House, originally consisted of two hostels, which were purchased by Hugh de Balsham, sub-prior of Ely, who appropriated them, in 1257, to the use of students. In 1284 he completely endowed his foundation for the support of a master, 14 fellows, 29 bible-clerks, and 8 poor scholars; the number to be increased or diminished according to the fluctuation of the revenues. Numerous benefactions have since been given to this foundation, and the fellowships are accordingly increased. The chapel was erected by subscription in the year 1632, and is neatly embellished, but was deprived of many of its ornaments by the fanatics in the civil wars. The building surrounds two courts, which are separated by a cloister and gallery, and the largest court has had its buildings cased with stone within a few years.

Clare Hall was built on the site of the University Hall, which was a small college, founded in the year 1326 by Dr. Richard Baden, then chancellor of the university. About 16 years after its erection, it was consumed by fire, but rebuilt on a much more extensive scale in 1344, by Elizabeth de Burg, heiress to the last earl of Clare. By this lady it obtained its present name, with endowment for a master, 10 fellows, and the same number of scholars. Richard III., Thomas Cecil, earl of Exeter, John Freeman, esq., William Butler, esq., and Samuel Blyth, esq. all contributed in augmenting the revenues, which now maintain 17 fellows, and between 30 and 40 scholars. This is the most uniform in its buildings, and is the most pleasantly situated of any college in the university. It was rebuilt of stone in 1638, except its chapel, which was erected in 1703, from a design by sir James Burroughs. This college stands near the north-west angle of King's College chapel.

Pembroke Hall was founded by Mary, countess of Pembroke, in 1343, and endowed in pursuance of a charter from Edward III. for a master and six fellows. Among the benefactors who have enlarged this establishment, Henry VI. is the most considerable; who augmented it with the rich living of Soham in this county, and with some other rectories. In his charter it is termed "the most noble, renowned, precious college, which, among all others in the university, was ever wonderfully resplendent." The present number of fellowships is 16, and the scholarships about 70. The chapel was built from a design of sir Christopher Wren, by his uncle, bishop Wren. Contained in a small detached building of this college is a large and curious astronomical machine, or sphere, which was given and partly made by Dr. Roger Long, author of a celebrated treatise on astronomy; in which work it is particularly described; and the Dr. at his death bequeathed the interest of 200*l.* bank annuities to keep "the instrument and place" in good repair. This, like many other useful bequests, is perverted to private emolument, and the object consequently neglected. This college consists of two courts, which are separated by the hall, having the combination room at one end.

Corpus Christi, or *Bene't College*, differs in its origin from all others, in either of the universities; those having been founded by the benevolence of one or two persons, while this was established by the union of two guilds, or religious

societies. The college was begun in 1344, and its buildings were rapidly advanced by the influence of Henry Plantagenet duke of Lancaster, whom the brethren had chosen as their first *alderman*. By the munificence of sir John Cambridge and his son, the revenues were considerably augmented and finally appropriated, in the year 1356, to the maintenance of a master, eight fellows, three bible-clerks, and six scholars. Since that period, the endowments have increased sufficiently to support twelve fellowships, and nearly sixty scholarships. The name of Bene't, or Benedict college, arose from its proximity to the church dedicated to that saint. Matthew Parker, archbishop of Canterbury, was the greatest benefactor to this college, having founded two fellowships and five scholarships, and bestowed on it the valuable library of Stoke-clare college, Suffolk, besides many other printed books and manuscripts. This college consists principally of buildings round a square court.

Gonville and Caius College, commonly called Keys College, was originally founded in the year 1348, by Edmund Gonville, who left a large sum of money with Dr. Bateman to finish and endow it. The doctor being then employed on his own college (Trinity) did not immediately proceed with this building, but afterwards had it erected near his own foundation. Thus the present building is posterior to that of Trinity, but its foundation and endowment being anterior, it certainly claims precedence in chronological arrangement. After its completion, it was called Gonville Hall; but in 1557 it obtained the present title, and was considerably increased in revenues and buildings. This was effected by Dr. John Caius, physician to queen Mary, who built a new court, and three remarkable gates of various and eccentric architecture. That on the south, communicating with the schools, is said to be the first specimen of regular or Roman architecture erected in this country. The gates are respectively inscribed, "Humilitatis," the gate of Humility; "Virtutis," the gate of Virtue; "Io. Caius Posuit Sapientiae," John Caius built this in honour of Wisdom; "Honoris," the gate of Honor. Since the decease of Dr. Caius, the fellowships have increased to 29, and the scholarships to nearly 100. The principal court of this college has been partly rebuilt, and is cased with stone.

Trinity Hall was one of those original hostels wherein the students resided at their own expence. It was purchased by Richard Crowder, prior of Ely, in the reign of Edward III.; and was converted into a college, in 1351, by Henry Bateman, bishop of Norwich. The founder provided for a master, three fellows, and two scholars; but various subsequent benefactions have increased the fellowships to twelve, and the scholarships to fourteen. The whole of this hall is faced with stone, and the buildings have a neat and uniform appearance.

King's College, the glory and pride of the university, owes its origin and foundation to king Henry VI. who, in 1441, dedicated it, and in 1443 fully endowed it for a provost, 70 fellows, or scholars, 3 chaplains, 6 clerks, 16 choristers, and a music master, 16 officers of the foundation, 12 servitors for the senior fellows, and 6 poor scholars. The monarch, dying before the establishment was completed, left particular directions and bequests in his will for the fulfilment of his magnificent and pious designs. These, however, were never completed, and only a small part of the intended buildings have been erected. Some peculiar privileges appertain to this college. (See Raworth's University Calendar, 12mo. 1801.) Edward IV. instead of forwarding the plans of his predecessor, deprived this college of many large estates, which, with aggravated injustice, he gave to some of the sycophant

tycophant Oxonians then about his court. Henry VII. being safely seated on the throne, directed his attention, towards the latter end of his reign, to this building, on which he expended 2000*l.* and presented the college with 5000*l.* more for the purpose of finishing the chapel. Besides the elegant chapel already noticed, this college consists of a row of buildings to the south, also a large square of buildings to the north of the chapel, and the provost's residence, &c. to the east. In the library of the chapel is a plan of the college, as intended to be built by Henry VI. and some additional buildings are now proposed to be erected.

Queen's College was founded in the year 1448, and endowed with revenues to the amount of 200*l.* per annum for the support of a principal and four fellows, by Margaret of Anjou, the intrepid consort of Henry VI. Elizabeth Widville, or Grey, queen of Edward IV. though a professed enemy to the founder, was prevailed on by Andrew Duckett the master, to complete this college, and establish it for a master, 19 fellows, and 45 scholars. The lady Elizabeth has since been annually celebrated as the co-founder. The buildings surround two quadrangular courts, one of which has a cloister of about 330 feet encompassing it. The chapel is fitted up peculiarly neat.

Catharine Hall owes its foundation to Robert Woodlark, chancellor of the university, who in the year 1474 endowed it for a master and three or more fellows. This number is now increased to five; and eight bye-fellowships with ten scholarships have since been added. The buildings occupy three sides of a quadrangular court.

Jesus College was erected on the site of an ancient Benedictine nunnery, and founded by John Alcock, bishop of Ely, in 1496, for a master, six fellows, and six scholars. The endowments have been increased, and now provide for sixteen fellows, and nearly fifty scholars. This college is situated at a short distance from the town, and its chapel, from the size and character, appears to have been the ancient conventual church, which was dedicated to St. Rhdagund in 1160.

Christ's College was built on the site of an hostel, called God's-House, and appears to have been first founded by Henry VI. and completely endowed, in 1506, by Margaret countess of Richmond and Derby. The persons now maintained on this establishment are a master, 15 fellows, and about 70 scholars. The ancient buildings of this college inclose a small quadrangular court, behind which is a more modern uniform building, erected by Inigo Jones.

St. John's College received its name from the dissolved hospital of St. John's, on the site of which it was built, and founded in 1511, though not opened till 1516. This was originally endowed by Margaret countess of Richmond, for a master and thirty-one fellows; but subsequent benefactions have united to raise a revenue to support sixty-one fellows and one hundred and fourteen scholars. The buildings of this college are mostly of brick, and surround three courts.

Magdalen College owes its origin to Edward Stafford duke of Buckingham, who erected part of the present fabric, and intended to have endowed, and named it from his own title, but being beheaded, this with his other property was confiscated. In 1542 it was obtained from the king, and endowed by Thomas lord Audley, for a master and four fellows. The latter number has since been increased to seventeen, and several scholarships have also been added. This college is built of brick, and consists of two courts. Its library is noted on account of containing the valuable books and MSS. of Samuel Pepys esq. who was secretary to the Admiralty in the reigns of Charles II. and James II.

Trinity College contains the largest buildings, and possesses the most considerable endowments of any collegiate establishment in this university. Its buildings surround two very large quadrangular courts, and its entrance-gateway, chapel, and library are fine and interesting objects of architecture. This college was founded by Henry VIII. in 1546, on the site of two other colleges and a hostel, and endowed for a master, sixty fellows, sixty-seven scholars, four conductors, three public professors, thirteen poor scholars, twenty beadsmen, and other officers with servants: the number on the establishment, at present, amounts to upwards of four hundred. The inner-court is called Neville's-court, from the name of Dr. Thomas Neville, at whose expense it was chiefly built, in the year 1609. Its western side is formed by the library, which is a magnificent and spacious building, 200 feet in length, by 40 in breadth, and 38 in height. Beneath the library is a spacious piazza, which opens to the river and the gardens. In the chapel is a fine statue of sir Isaac Newton, executed by Roubiliac. This figure is considered one of the finest specimens of English statuary.

Emanuel College was founded by sir Walter Mildmay, on the site of a Dominican convent, in 1584, and endowed for a master, three fellows, and four scholars. By additional donations the revenues now support fifteen fellows, and nearly one hundred scholars and exhibitionists. The hall is said to be the most elegant of any in the University.

Sidney Sussex College derives its foundation from Frances Sidney, countess of Sussex, who, by will, dated December 6th 1588, bequeathed 5000*l.* and some other property to found a college for a master, ten fellows, and twenty scholars. The first stone of this college was laid on the 20th of May 1596, and the building completed in little more than three years. The chapel and the library were rebuilt about twenty years since, and various other alterations made at the same time. The foundation provides for seven fellows, ten bye-fellows, twenty scholars, and twenty-four bye-scholars, besides a mathematical lecturer, and several exhibitioners.

In each, and all of these colleges, are various portraits of founders, and eminent persons who have received education, or been immediately connected with the respective foundations. Each, also, contains a library, and in some are various useful, curious, and valuable natural and artificial objects. Numerous manuscripts, missals, &c. contribute to enrich, and dignify many of these libraries; but to particularize the whole, or even barely to mention the most considerable, or important, would compel us to extend this article beyond the bounds of propriety and consistency. At the end we shall refer to such works as contain more detailed information on these subjects. All the colleges of this University are accommodated with spacious and pleasant gardens, having convenient walks, which are sheltered and enriched with rows of noble trees. Most of them are situated on the banks of the river Cam, at the western extremity of the town. It is justly remarked by strangers who visit Cambridge, that its colleges and public buildings are, in general, neither grand, elegant, nor in a good style of architecture; and that a national University should display and encourage the polite arts of the country. In the college now preparing to be built, it is hoped that the directors or Committee will select such designs as shall at once be a memento of their taste, an honour to the University, and creditable to English talent.

The University is composed of a chancellor, vice-chancellor, the masters or heads, fellows of colleges, and students, amounting in all to more than 2000 members; and is incorporated.

porated as a society for the study of all the liberal arts and sciences. Each college, or hall, is a body of itself, and bound by its own statutes; but is likewise controuled by the paramount law of the University, each furnishing members for the government of the whole; which government is administered by the following officers:—

1. *A Chancellor*, who is some nobleman, and may be changed every two years, or continued longer by the tacit consent of the University.—2. *A High Steward*, chosen by the senate, and holding his office by patent from the University; he is allowed a deputy.—3. *A Vice-chancellor*, who is usually the head of some college or hall, and chosen yearly on the 4th of November, out of two persons nominated by the heads.—4. *Two Proctors*, chosen annually on the 10th of October, who must be masters of arts; they attend to the discipline and behaviour of all under-masters of arts; read the graces, and take the votes in the White-hood house.—5. *Two Taxors*, chosen as the proctors, and who with them are clerks of the markets, and have cognizance of weights and measures; they were originally intended to tax, or fix the rent of the houses let to the scholars for their residence.—6. *Two Moderators*, who superintend the exercises and disputations in philosophy, and the examinations previous to the degree of bachelor of arts.—7. *Two Scrutators*, whose office is to read the graces, and take votes of the Black-hood house, to which they always belong.—8. *A Commissary*, who is usually appointed an assistant or assessor, and deputy high-steward to the vice-chancellor in his court, (much the same as a recorder is to a mayor, or a chancellor to a bishop).—9. *A Public Orator*, who is the mouth of the University on public occasions, writes their letters, presents noblemen to their degrees with a speech, &c.—10. *The Caput* consists of the vice-chancellor, a doctor of divinity, a doctor of laws, a doctor of physic, a regent and non-regent master of arts, who are chosen yearly on the 12th of October, and are to consider and determine what graces are proper to be brought before the body of the University; and each of them has a negative voice. All graces must first pass the caput before they can be produced to the senate.—11. *Two Librarians*.—12. *A Registrar*.—13. *Three Esquire Bedells*, &c. There are also professors in divinity, civil law, physic, casuistry, hebrew, greek, arabic, mathematics, philosophy, astronomy, anatomy, chemistry, botany, modern history, common law, fossils, and music.

The Senate is composed of all the doctors and masters of arts in the University, and is divided into two bodies or houses. The first consists of regents, or those who have not been masters of arts five years: they are also called white-hoods, from the hoods of their official dresses being lined with white silk. The second, of non-regents, or those who have taken the degree of master upwards of five years, but have not advanced to the degree of doctor; these are called black-hoods for a similar reason. The doctors under two years standing vote solely in the regent-house; but all others, with the public orator, may vote in which house they please; and either house is competent to reject a question. In the senate-house the election of all officers takes place, the appointments of the magistrates, the admission to degrees, and all other important business of the University. No language but Latin is permitted to be spoken at any official meeting in the senate-house. Some questions are determined by the body collective, as the choice of members of parliament. At the election in 1790, the number of members who voted was 684; absent, or did not vote, 181; in all 865. The privilege of sending members to parliament was first granted to the University by James I. in 1604. The whole

number of fellows in the University is 406, and of scholars 666; besides which there are 236 inferior officers and servants of various kinds, who are maintained on the foundation; these, however, are not all the students of the University. There are besides two other orders, called pensioners, the greater, and the less: the greater pensioners are the young nobility and gentlemen of fortune, who are called fellow-commoners, because they dine with the fellows; the less are dieted with the scholars; but both live at their own expence. There is also a considerable number of scholars of an inferior fortune, called *fizaris*: these, though not of the foundation, are capable of receiving many benefactions called exhibitions, which assist them greatly in passing through an expensive education; and frequently, by merit, they succeed to the highest honours and emoluments. The students, according to their standing and proficiency in learning, are entitled to the degrees of bachelor and master of arts, bachelor and doctor in divinity, physic, and law. The time required by the statutes for studying in the University, before each can be qualified for taking the said degrees is three years for a bachelor, and about four years more for a master of arts; seven years after that he may commence bachelor of divinity, and then five years more are required to take the degree of doctor in divinity. In law, a student may commence bachelor after six years, and in physic after five years standing: both may be proctors at the end of five years more. The proper time for conferring these degrees is called the commencement, which is always the first Tuesday in July, when the masters of arts, and doctors of all faculties, complete their degrees respectively. The examination for the degree of bachelor of arts usually begins on the Monday se'nnight after the Epiphany, and the degree is completed on the second tripos-day next following. Persons are commonly admitted to the degree of bachelors in divinity on the 11th of June. The nobility, which includes baronets, as such, are entitled to degrees without waiting the statutable time. In the year 1786, some disputes having arose concerning the practice of conferring degrees in right of nobility, the statutes were examined, and it was determined that the following persons were entitled to honorary degrees: viz. 1. Privy-counsellors.—2. Bishops.—3. Noblemen—Dukes, Marquisses, Earls, Viscounts, Barons.—4. Sons of Noblemen.—5. Persons related to the king by consanguinity or affinity, provided they be also honourable.—6. The eldest sons of such persons.—7. Baronets.—8. Knights. The two last to the degree of M. A. only.

As a stimulus to that laudable emulation which should ever be encouraged in the youthful mind, the University, and different individuals have left several sums of money, &c. to be annually distributed among the scholars, as "the reward of merit."—The yearly donations thus bestowed by the University amount to 353l. 5s. of which 50l. is given to such as excel in mathematics, and 303l. 5s. for the encouragement of classical and English compositions. The annual prizes conferred by individual colleges amount to 286l. two-thirds of which are appropriated to promote classical literature.

Thus, by the liberality of different persons, zealous for the honour and advantages of learning, has this University attained a high degree of eminence, and many of its members have been materially benefitted. The various incentives to excellence here held forth, and the numerous rewards of merit annually distributed are exquisitely adapted to rouse genius into energy, and impel sluggishness to action, to give resolution to timidity, and furnish modesty with hope. How animating must it be to the emulous mind, to reflect

reflect that, "it is placed under those venerable walls, where a Hooker and a Hammond, a Bacon and a Newton, once pursued the same course of science, and from whence they soared to the most elevated height of literary fame. This is that incitement which Tully, according to his own testimony, experienced at Athens, when he contemplated the porticoes where Socrates sat, and the laurel grove where Plato disputed." (Idler, N^o 33.) N. lat. 52° 12' 36". E. long. 0° 4' 15".

"Majestic Granta, hail thy awful name,
Dear to the muse, to liberty, to fame." MASON.

Deighton's Cambridge Guide, 12mo. 1804. The Cambridge University Calendar, 12mo. 1805. Memorabilia Cantabrigiæ, 8vo. 1803. Parker's History and Antiquities of Cambridge, 8vo. Fuller's Church History, fol.

CAMBRIDGE, a township in Grafton county, New Hampshire, North America, E. of Androscoggin, and S. of Umbagog lake.

Also, a township of Washington county, New York, containing, by the census of 1790, 4996 inhabitants, including 41 slaves; and by the census of 1796, it appears, that it has 623 electors.—Also, the half-shire town of Middlesex county, Massachusetts, which is one of the largest and most respectable townships of the county. Its three parishes, Cambridge, Little Cambridge, and Menotomy, contain three congregational meeting-houses, one for Baptists, and another for Episcopalians, a number of pleasant seats, and 2115 inhabitants. It is connected with Boston by an elegant bridge. The public buildings are the meeting-houses, court-house, and the edifices belonging to Harvard University, which are four in number, viz. Harvard, Hollis, Massachusetts Halls, and Holden chapel. This University is, with regard to its library, philosophical apparatus, cabinet of minerals, and professorships, the first literary institution on the American continent. It takes its date from the year 1638, seven years after the first settlement in the township, then called Newtown. It has generally from 140 to 200 students. By a mean of the observations made in this place during the years 1781 and 1783, its temperature appears to be 50° 3, that is, about 10 degrees below the European standard. N. lat. 42° 25'. W. long. 71° 10'.—Also, a post-town of Ninety-six district, in the upper country of South Carolina, where the circuit courts are held. It contains about 60 houses, a court house, and a brick-gaol. The college by law instituted here, is no better than a grammar-school: 80 miles N. N. W. of Columbia; 50 N. by W. of Augusta in Georgia; 140 N. W. of Charlestown, and 762 S. W. of Philadelphia. N. lat. 34° 9'.—Also, the chief town of Dorchester county, Maryland, situate on the south side of Choptank river, about 13 miles E. S. E. from Cook's point at its mouth: nine W. S. W. from Newmarket; and 57 S. E. from Baltimore. Its situation is healthy, and it contains about 50 houses, and a church. N. lat. 38° 34'.—Also, a town of Franklin county, Vermont, situate on both sides of La Moille river, about 20 miles W. of Lake Champlain. It has 359 inhabitants.

CAMBRIDGE Manuscript, or Beza's MS. a copy of the Gospels, and Acts of the Apostles in Greek and Latin, noted by Wettstein in the 1st and 3d parts of his Greek Testament by the letter D. In the Greek it is defective, from the beginning to Matth. i. 20; in the Latin, to Matth. i. 12; and it has likewise the following chasms: Matth. vi. 20.—ix. 2. xxvii. 1—12. John, i. 16.—iii. 26. Acts, viii. 29.—x. 14. xxi. 2—10. xxii. 10—20. And from xxii. 29 to the end. Some pages of this MS. containing Matth. iii. 8—16. John, xviii. 13.—xx. 13. Mark, xvi. 15, to the end, are written by a later hand, which Wettstein refers to

the 10th century, but Griesbach to the 12th. The Gospels are arranged in the usual order of the Latin MSS. Matthew, John, Luke, Mark. Dr. Kipling, in a preface to his edition of this MS., has comprized his observations upon it under four distinct heads, of which we shall avail ourselves in the sequel of this article. He begins, *first*, with establishing its high antiquity. It is universally allowed, by the most competent judges, that this MS. is one of the most ancient. Those who give it the least antiquity assign it to the 6th or 7th century. Wettstein and I. D. Michaelis deem it much older: and Dr. Kipling is of opinion, that it is more ancient than the Alexandrian MS. and must have been written in the second century. His conjecture is founded on these circumstances; that it wants the doxology at the end of the Lord's prayer, and has the Ammonian sections, without the Eusebian canons. That the doxology is an interpolation, admits of little doubt; but it is not so clear how the want of it in a MS. furnishes a proof of the high antiquity of that MS. If the writer of Beza's MS. were a Latinist, he might leave out the doxology in his Greek copy, because it was not in his Latin copy; or his Greek copy might have been one of those which wanted the doxology. Dr. Kipling's argument, derived from the entire omission of the Eusebian canons, and from the Ammonian sections being added by a posterior writer, is more specious. Hence he infers, that the text of the MS. was written antecedently to the date of the Ammonian sections, and these before the Eusebian canons appeared. Ammonius lived in the third, Eusebius in the fourth century: the Ammonian sections in Beza's MS. are much posterior to the text, and are without the canons of Eusebius; therefore it is highly probable that those sections were added to the MS. before the fourth, and that the MS. itself was written before the third century. However, a MS. of the 5th, 6th, or 7th century might have been written, in uncial letters, without either the marginal sections of Ammonius, or the canons of Eusebius; and the former might have been added without the latter some years after that period. This argument has been applied by Grabe, Casley, and Woide to the Codex Alexandrinus (See ALEXANDRIAN copy), and by Hichtel to the Codex Vaticanus. It deserves to be further illustrated and examined. In MSS. of the New Testament, the four Gospels are divided into greater and smaller portions; the one called *τιτλος*, the other *κεφαλαιον*; in the same manner, though in different proportions, as we divide them into chapters and verses. The *τιτλοι*, or larger portions, were generally marked in the upper margin; the *κεφαλαια*, or, as they are frequently called, the Ammonian sections, were always marked at the side; and to these sections Eusebius adapted his ten tables, or harmony of the Gospels, to which he referred by writing, under each of the Greek letters or numbers expressive of the Ammonian sections, letters which denoted that part of each table where the section was to be sought. This is clearly exhibited either in Stephens's edition of 1550, or in Kuster's edition of Mill's Greek Testament. The Acts of the Apostles, and the Epistles, were likewise divided into sections, called, from the inventor, the sections of Euthalius; and they were noted in the margin by letters, in the same manner as the Ammonian sections in the Gospels. As the Euthalian sections are not marked in the margin of the Acts of the Apostles, and the Epistles, in the Alexandrian copy, though the *τιτλοι* and *κεφαλαια* are noted in the Gospels, Grabe, Casley, and Woide, contend, that the Alexandrian copy was written before Euthalius had introduced these sections, that is, before the year 396. Mr. Marsh, however, (*ubi infra*) observes, that a considerable time might have elapsed after the year 396, before these sections were brought into

into general use. Besides, though no sections are marked in the margin of the Alexandrian copy, in the Acts, and the Epistles, yet the text itself is very distinctly divided into sections, by blank spaces at the end of each section, and by large letters written in the margin, at the beginning of each section. The divisions into smaller portions was probably later than the division into larger portions; and the portions into which the Acts of the Apostles are divided in the Alexandrian copy, appear to be nothing more than a subdivision of the Euthalian sections. Upon the whole, says Mr. Marsh, the writer of the Codex Alex. seems to have been unacquainted with the Euthalian division, and Woide's argument is indecisive. In applying the same argument to Beza's MS. the same objection will occur. For though no sections are noted in the margin, yet the text itself is divided into sections, not by blank spaces, as in the Alexandrian copy, but by the first word of each section being so written, that the first letter stands in the margin, which is sometimes greater, but in general of the same size with the other letters. It appears, on an examination of Beza's MS., that whenever an Euthalian section commences in the Alexandrian MS. a new section begins in Beza's MS., and that the sections of these two MSS. in the Acts of the Apostles, are only different subdivisions of the Euthalian sections. This argument, therefore, instead of being favourable to these MSS., rather proves, that neither of them was written before the fifth century.

Moreover, the *παραβολαι* of Eusebius are wholly unnoticed in the margin of Beza's MS.; and the *κεφαλαιαι*, or Ammonian sections, are not accompanied with the references to the canons of Eusebius. This is observed by Mill, in his "Prolegomena," who ascribes the omission of these references to forgetfulness; but this, says Mr. Marsh, cannot have been the reason, because the sections are sometimes written so close together, as to leave no room for a reference between them. This ingenious writer expresses his surprise that Mill did not deduce this very obvious inference from the omission of these references to the canons of Eusebius, viz. that Beza's MS. was written, not indeed before the time of Eusebius, but before the tables which he invented were brought into general use; and as Eusebius was a man of so distinguished a character, and we know that Jerom himself adopted these canons, we might suppose, that they were generally adopted within 100 years after their invention. But the true reason why Mill did not apply this argument, was his having seen several other MSS. of the gospels besides Beza's copy, which have the Ammonian sections without the references to the canons of Eusebius. Their absence, therefore, from the Codex Bezae affords no absolute proof of its antiquity. Besides, the Ammonian sections in Beza's MS. are noted in the margin by a different, and, of course, later hand, than that which wrote the MS. itself. This is asserted by Mill, Wetstein, and Griesbach, who have all examined the MS. Although the Ammonian sections are noted in the margin with the same uncial letters as are used in the text, and the ink is in both places of the same tawny colour; yet the letters in the margin are somewhat smaller than those in the text, and some of the former, when closely examined, manifestly differ from those in the latter. Instances to this purpose are produced by Mr. Marsh. It is certain also, he adds, that the writer of the Codex Bezae did not intend that the text should be divided into the Ammonian sections; for he has actually divided it into sections of a totally different kind. They are denoted by the first word of each section projecting into the margin; so that the first letter stands out of the text, but is contiguous to the second letter, and is generally of the same size with the rest, though

it is sometimes larger. A further proof that the writer of the Codex Bezae did not intend to mark the Ammonian sections is, that an Ammonian section frequently begins in the middle of the line; whereas those above mentioned commence always at the beginning of the line. And though the person who added the Ammonian sections has constantly added two dots (:) before the word which begins the section, yet the interval is frequently so small between it and the preceding word, that he was obliged to add them nearly at the top of the letter. What argument then can be deduced from the above-mentioned omission, in respect to the antiquity of Beza's MS.? If we conclude that it was written before the invention of the Ammonian sections, we shall refer it to the beginning of the third, or the end of the second century; against which it may be objected, that the conclusion would be too hasty, because a considerable time might have elapsed before their use was become general. But as these divisions were adopted and recommended by Eusebius in the fourth century, and likewise by Jerom at the end of the same, and beginning of the following century, they must have been universally known before the close of the fifth; and though it may be said that the writer of the Codex Bezae must have copied from some more ancient MS., and might therefore transcribe the old, long after the new divisions were introduced, we may reply, says Mr. Marsh, that as the Codex Bezae is written in a splendid and expensive manner, it is probable, that the person or persons for whom it was written, would have chosen that such chapters or sections should be observed in it, as were in general use at the time when it was written. If we argue, therefore, from the omission of the Ammonian sections, we may fairly conclude, that the Codex Bezae is at least as ancient as the fifth century. But as the writer of this MS. has adopted sections in the Acts of the Apostles, which imply the previous existence of the Euthalian sections, we would not, says Mr. Marsh, ascribe to it a greater antiquity. If we argue, says this judicious critic, from the internal evidence of the text, and conclude from the antiquity of its readings, that is, from the circumstance that the Codex Bezae is free from many spurious additions and alterations, that were introduced into the more modern Greek MSS.; the inference deducible is, not that the MS. itself is ancient, but only that it has a very ancient text, which is a matter of much greater importance than the antiquity of the vellum and the ink. It is certain that it was written before the eighth century, from the shape of the letters, the want of intervals between the words, and also of accents and marks of aspiration; for in the eighth century, the Greek uncial letters degenerated from the square and round form, which is seen in the Codex Bezae, into an oblong shape; marks of aspiration, and accents were added, and the elegance of writing considerably decreased. It appears also from comparing the letters of the Codex Bezae with the Greek inscriptions given by Montfaucon, (Pal. Græc. p. 158—175.) not only that it *must* be more ancient than the eighth century, but that it *may* be as ancient as the sixth, the fifth, or even the fourth century. No inscription resembles it so exactly, as to the shape of its characters, as that given by Montfaucon, which was engraved about the middle of the sixth century, in the reign of Justinian. But this is no argument against its higher antiquity. Upon the whole, from comparing the Codex Bezae with Greek inscriptions of different ages, we may conclude that it cannot have been written later than the sixth century, and that it may have been written even two or three centuries earlier. The tawny colour of the ink discovers, indeed, the highest antiquity: but no great stress can be laid on this circumstance, because, if two MSS. were written with
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the same ink, the one in the fourth, the other in the sixth century, they would probably be faded at present in a nearly equal degree; and the difference between 12 and 14 hundred years would hardly be sufficient to enable us to discover at present any difference in the colour; not to add, that as some inks are more durable than others, the letters of a modern MS. may be more faded than those of a more ancient MS. With respect to the comparative antiquity of the Codex Bezae with that of other MSS., it may be safely asserted, that no one can be put in competition with it, except the Codex Vaticanus. The most ancient Greek MSS., meaning those only which are quoted by Wettstein, besides these two, have, according to him, the usual *τις* and *κα* *παλαια*. We may therefore suppose, that those which have more ancient divisions, and have other marks denoting the greatest antiquity, are in this respect entitled to the highest rank. If it is asked to which of these the precedence is due, Mr. Marsh replies, to the Codex Bezae; for the Codex Vaticanus has accents and marks of aspiration which were added by the person who wrote the MS. itself.

The second object to which Dr. Kipling directs his attention is the *nature and excellence* of Beza's MS. Antony Arnauld maintains, that it is a forgery of the 6th century, and therefore, unworthy of credit; and his chief argument for this unfounded opinion is, that it has additions or interpolations, which are not found in the copies anterior to that period: but this assumption is not just, for it is very far from being certain that the same and similar interpolations were not found in any other MS. before the 6th century. Dr. Kipling, on the other hand, alleges, by a method of reasoning not very satisfactory, that the additions above mentioned are proofs that either the MS. of Beza, or its archetype, must have been written before Jerom corrected the text of the New Testament, because they are not in his version. Bengelius supposes this MS. to be of British manufacture, from its very great conformity with the Anglo-Saxon version; and that it was reformed, or rather depraved, by means of the Italic version. To which it is replied, that the MS. of Beza resembles the Syriac version as much as it does the Italic and Anglo-Saxon; and, therefore, it may as justly be called a Syriacizing MS. as a Latinizing one. In this connection we may observe, that according to the opinion of Wettstein, in which he was generally followed, till Semler questioned it, the Codex Bezae contained a Greek text which was altered from the Latin; or, in other words, that the writer of the Codex Bezae departed from the readings of the Greek MS. or MSS. from which he copied, and introduced in their stead, from some Latin versions, readings which were warranted by the authority of no Greek MS. Allowing as a fact, that a great number of the readings peculiar to the Codex Bezae are found in the Vulgate, and that they are found in no Greek MS. at present known, and that with regard to most of the readings, in which the Codex Bezae differs from all the Greek MSS., it agrees with some one of the Latin versions published by Blanchini; shall we hence conclude, that these readings were actually borrowed from a Latin version, and translated into Greek? It is at least as possible, says Mr. Marsh, that they might have had their origin in the Greek, as in the Latin: and this possibility is sufficient to defeat the whole of Wettstein's hypothesis. Besides, it is highly probable, as well as possible, that this might be the case. It is merely more reasonable to suppose, that a translation would be altered from an original, than an original from a translation: and this supposition is confirmed by fact, for when Jerom revised the Latin version by order of pope Damasus, he corrected it from Greek MSS. Besides, the Codex Bezae has additions, omissions, and trans-

positions, which are found neither in the Vulgate nor any other Latin version now extant. Since, therefore, the Latin versions of that MS. agree with the Greek text, even in places where it is supported by no Latin MS. at present known, we must conclude, that the Latin was adapted to the Greek, and not the Greek to the Latin. That the Codex Bezae should agree, either with the Vulgate, or some other Latin version, is not extraordinary, when we reflect, that this MS. is one of the oldest now extant, and that the Greek MSS., from which the Latin versions were made, come nearer to it, in point of time, than to those Greek MSS. from which the Codex Bezae differs. To this must be added, that a great number of these readings are found in the Syriac, the Coptic, the Sahidic, the margin of the Philoxenian version, the Versio Syra-Hierosolymitana, and the quotations of Origen. And we must suppose that all these have been corrupted from the Latin; if the charge be true, with respect to the Codex Bezae. There is no reason whatever for ascribing any reading of a Greek MS. to the influence of the Latin, unless it can be proved, that it could not have taken its rise in the Greek, and that it might easily have originated in the Latin. But no instance of this kind has been produced from the Codex Bezae. Michaelis mentions two instances out of many more which might be produced, which seem to rescue the copyist from the charge of having corrupted the Greek from the Latin. 1. The Greek text varies sometimes even from the Latin version, with which it is accompanied. 2. The Latin text appears, in some cases, to have been altered from the Greek. We shall only add, under this head, that as the Codex Cantabrigiensis was probably written in Europe, as appears from its being accompanied with a Latin translation, it seems improbable that the Syriac version should be used in the correction of a MS. written in a country where the Syriac language was wholly unknown; and the only supposition that can make the conjecture probable is, that the Greek text of the Cod. Cant. was taken from a Greek MS. written in Asia. But this conjecture is altogether unnecessary. Upon the whole, the Biblical critic may probably not demur in subscribing to the judgment of Mill or Semler, as to the utility of this and other similar Græco-Latin MSS.; that they are valuable monuments of antiquity, and exhibit many important readings, to be found in no pure Greek copies, but which are mostly inserted in the old Italic version, and in the works of the Latin fathers.

As to the Latin version, annexed to the Greek of Beza's MS., it is evidently the old Italic, before it was corrected by Jerom. It is, in general, an exact counterpart of the original, from which it rarely deviates. The intention of the writer, whoever he was, seems to have been to make his Latin copy tally with the Greek. That he adapted his Latin version to his Greek text is clear from many passages that might be adduced. On the other hand, the writer of Beza's MS. sometimes, though not so frequently, adapted his Greek text to some Latin copy. In John, v. 2. the Greek has *Βεζου* instead of *Βησενδα*, which reading, it is probable, was never found in any pure Greek copy of St. John: but it is the Latin reading of Corby's MS. as well as of Beza's; to which the former bears throughout a strong resemblance. Dr. Kipling imagines, for reasons which he alleges, that the Latin version in Beza's MS. is not all written by the same hand.

The third object of Dr. Kipling's research is the *peregrinations* of the Cambridge MS., which he traces from Egypt to Cambridge. We shall, with Michaelis, invert the order of this route, because our knowledge of it in later times is certain; whereas the higher we ascend, the greater is the obscurity in which we are involved, till at length we lose

ourselves in the maze of those unwarranted conjectures that have been hazarded by Wettstein. It is a 4to size, and written on vellum; 66 leaves of it are much torn and mutilated, ten of which are supplied by a later transcriber. In 1581, the University of Cambridge received this MS. as a present from Theodore Beza, who then resided at Geneva. It had been in his possession about 19 years; and was found, according to his account, in the monastery of St. Irenæus at Lyons, in the year 1562; from which period he made use of it till the year 1581, and has frequently quoted it in his edition of the Greek Testament, published in 1582. Beza wrote, in the beginning of this MS., the following account with his own hand. "Est hoc exemplar venerandæ vetustatis ex Græciâ, ut apparet ex barbaris quibusdam Græcis ad marginem notatis, olim exportatum, et in S. Irenæi monasterio Lugdunensi, ita, ut hic cernitur, mutilatum, postquam ibi in pulvere diu jacuisset, repertum, oriente ibi civili bello, Anno Domini 1562." He gives the same account in his letter to the University of Cambridge, dated Geneva, Id. Decemb. 1581; and also in the page preceding the preface to his edition of the Greek Testament, printed in 1582.

That the MS. came originally from Greece is conjecture; but that it was discovered in the monastery of St. Irenæus, at Lyons, depends upon the direct and positive evidence of a man, whose veracity we have no reason to doubt. Wettstein asserts, and it has been strenuously maintained by others, that the Cod. Cantab. and the Codex β . Stephani, which, as he relates, some of his friends had collated in Italy, for his edition of the New Testament, in 1550, are one and the same MS. Beza, however, quotes them as totally distinct; but in the opinion of Michaelis very obvious circumstances decide in favour of Wettstein. Mr. Marsh, without deciding on the question, impartially states the arguments on both sides, and leaves the determination to the reader. In favour of the opinion, that they are one and the same MS. Wettstein alleges, 1. That the *Lectiones singulares*, amounting to 450, quoted in Stephens's Margin from the Codex β . agree exactly with those of the Codex Bezae, except in some few instances, which appear to be typographical errors. 2. That where the Codex Bezae has chasms, no readings are quoted in Stephens's Margin from the Codex β ; though, if we except these chasms, the Codex β is quoted by Stephens in every page. 3. That several remarkable additions to the common text, found only in the text of the Codex Bezae, are quoted by Stephens from his Codex β . Against these arguments the following objections may be urged: 1. The *Lectiones singulares*, quoted from the Codex β . do not amount to 450, but only to 211. 2. To the second argument it may be replied, that the premises are not perfectly true, for the Codex β . is actually quoted by Stephens in four instances, where the Codex Bezae has a chasm. In favour of the opinion, that the Codex Bezae and the Codex β . are two distinct MSS. may be alleged the following arguments: 1. It appears from the direct and positive evidence of Beza, given clearly and consistently at three different times, that his MS. of the Gospels and Acts was discovered in the monastery of St. Irenæus, at Lyons, in 1562, and that from the intelligence he could procure, it had lain there time immemorial. If this account be true, the Codex Bezae could not possibly have been collated in Italy by Henry Stephens fifteen years prior to that period, and the MS., which Stephens collated must now lie buried in some Italian library. 2. Henry Stephens, who collated the Codex β . lived in habits of intimacy with Beza, and printed some of his editions of the Greek Testament; and must unavoidably have been led by the same curiosity, which induced

him to examine every Greek MS. which he could procure, to inspect, at least, the two celebrated MSS., which Beza used in his edition of 1582, and in which H. Stephens himself wrote the "*Exhortatio ad Lectorem*." If, therefore, Beza's MS. of the Gospels and Acts had been the very same which he himself had collated a few years before, he must have recognized so remarkable a MS., and of course would have mentioned it to Beza. But Stephens has no where given a hint of its being the same, though he had a fair opportunity of doing it, where he speaks of the MS. which he himself had collated, *viz.* in the preface to the edition of the Greek Testament of 1587, printed three years after Beza's third edition; and Beza constantly quotes it as a different MS. from the Codex Stephani β . 3. In four instances, where the Codex Bezae is defective, Stephens quotes readings from his Codex β . 4. The author of the "*Specimen Animadversionum in Prolegomena Wettstenii*," has produced twenty readings, in which the Codex Bezae and the Codex β . contradict each other. 5. Though the characteristic readings of the Codex β are found in general in the Codex Bezae, yet, on the other hand, there are some very long and remarkable readings in the Cod. Bezae, which Stephens has not quoted from his Codex β . To these arguments for the diversity of the MSS. it may be objected, 1. That Beza's positive evidence can go no further than to the place where, and the time when, the MS. was found, not to the number of years, during which the MS. had been preserved there. 2. That though H. Stephens, who collated the Codex β , and must frequently have seen the Codex Bezae, has no where asserted that they were one and the same MS., yet the argument drawn from his silence is only negative, and that arguments of this kind are not always conclusive. But it is more difficult to find an answer to the other part of this argument, *viz.* that Beza had constantly quoted the two MSS. as distinct; which he hardly would have done, if Henry Stephens had ever observed that they were one and the same. Wettstein, however, who takes for granted, that H. Stephens actually informed Beza that they were one and the same MS. goes so far as to accuse Beza of a wilful intention to deceive. 3. That the four quotations from the Codex β , in the two places where the Codex Bezae has a chasm, may be explained, either on the supposition, that two leaves, which are now wanting, have been lost since Stephens's time, or as typographical errors. 4. That the argument drawn from the contradictions referred to is inconclusive, because many instances may be produced of collations made by different persons from the very same MS. which contradict each other much more frequently than the extracts from the Codex β . contradict the readings of the Codex Bezae. 5. That the fifth argument is not absolutely decisive, since it is possible that H. Stephens might overlook the most remarkable readings, even in places where we should least expect it; and likewise possible, if he had noted them, that the same remarkable readings might have been overlooked both by R. Stephens and Beza. Michaelis, who adopts the common hypothesis, that the Codex Bezae and the Codex Stephani β . are one and the same MS., is reduced to the necessity of supposing, that the MS. which Henry Stephens collated in Italy, not long before the year 1550, was afterwards deposited in the monastery of St. Irenæus, and there discovered in 1562: though Beza declares expressly, that it had lain there time immemorial. Dr. Semler conjectures, that the Codex Stephani β . might have been a transcript of the Cod. Cant. and brought to Italy a short time before it was collated. Wettstein conjectures, that the Codex Bezae was either preserved during some time at Trent, or that Henry Stephens, after having collated

collated it in Italy, delivered it to the bishop of Clermont, at the time when the celebrated council was held there, in 1546, and that the bishop brought it from the council to his diocese of Clermont in Auvergne. These two parts of Wettstein's hypothesis directly contradict each other; for it appears, from Mattaire Hist. Stephanorum, that H. Stephens did not go to Italy till after the death of Francis I. which happened in 1547. He could not, therefore, deliver it to the bishop of Clermont, at Trent, in 1546; and if the bishop was in possession of the Codex Bezae, and brought it home with him, which we must suppose, if it was discovered at Clermont in Auvergne, in 1562, it cannot possibly have been the MS. which H. Stephens collated in Italy, between the years 1547 and 1550. Wettstein supposes, that Beza's MS. was found in France about the year of Christ 840, and that it is the same copy which Druthmar, an ancient expositor, who lived at that period, had seen, and which, he observes, was ascribed to St. Hilary. In this MS. the Latin arrangement of the Gospels was observed; but this of itself is not sufficient to prove its identity with Beza's, as 600 years ago there were other Greek MSS. besides the Cod. Cant. in which this order was followed. Besides, Semler has justly observed, that this MS. is Latin as well as Greek; and moreover it contains the Acts of the Apostles, which Druthmar has not related of his MS. Wettstein pretends to have discovered the Cod. Cant. among those which were collated at Alexandria, in 616, for the New Syriac Version, because he found a coincidence in several readings: but it is highly improbable, that a Latin translation would be added to Egyptian MSS. of the New Testament.

As to the place where this MS. was originally written, Simon, Mill, Wettstein, Michaelis, and most other critics, contend that it was written in the west of Europe, where Latin was better understood than Greek, since a translation would have been wholly superfluous, if the MS. had been written when the original language of the Greek Testament was the language of the country. Some have supposed without sufficient reason, that it was written by a Latin scribe; but this supposition is needless, because it is highly probable, that in Italy or some other part of the west of Europe, where Latin was spoken, and where this MS. was written, Greek scribes were employed for copying Greek books. This opinion is supported not only by Simon, Mill, Wettstein, Michaelis, &c. but it is likewise defended by Montfaucon, of whom Mr. Marsh says, he is one of the best judges of antiquity that ever existed. There is no presumption whatever, a priori, says the ingenious writer just mentioned, against the opinion, that the Codex Bezae was written in the west of Europe; and it is considered highly probable by the two following circumstances: 1. The Latin translation was added with no other view, than as a means of making the original intelligible to those who were not skilled in the Greek; and it was not added merely in consequence of the high authority of the church which used it. For in that case the transcriber would have adopted some established text, from which he would never have deviated; whereas the Latin text of the Codex Bezae is found in no Latin MS. either ancient or modern. It has omissions, inventions, and interpolations, agreeing with the Greek text to which it is added, but differing from all other MSS. whether Greek or Latin. This translation would have been altogether superfluous, if the MS. had been written for the use of a Greek, and still more so, if written in Egypt, as Father Georgi supposes, where Latin was unknown. 2. The gospels, in the Codex Bezae, as we have already observed, are written in the following order, Matthew, John, Luke, Mark; which arrangement was never ad-

mitted by the Greek church, or in any country subject to its authority; but it was the common arrangement of the ancient Latin MSS. as appears from the *Evangeliarium Quadruplex*, of Blanchini. From all these circumstances it seems reasonable to conclude, that the Codex Bezae was written in the west of Europe, in a country where the Latin was better understood than Greek, and which was subject to the authority of the church of Rome. A MS. written in one country may be easily transported into another; the Codex Alexandrinus, in the compass of a few years, was in Alexandria, Constantinople, and London; and that the Codex Bezae has been subject to several migrations is not improbable from the various corrections both in the Greek and the Latin texts. Another hypothesis has been proposed, which will solve the several phenomena relative to the Codex Bezae, as easily, or perhaps more so, than the preceding, viz. that it was written either at Constantinople, or in some city of the Greek empire in Europe, for the use of some person or community belonging to the Latin church, between the time of Constantine, and the final separation of the Greek and Latin churches. During this period, it is probable that many Latin families removed from Italy, and settled in some of the principal cities of Greece; and perhaps whole communities attached to the Latin church existed in Constantinople for a considerable time after the removal of the seat of empire. It is alleged that the Codex Bezae is exactly such a MS. as we may suppose to have been written for the use either of a Latin community, or some person of distinction, settled in a city of the Greek empire. It was brought perhaps towards the close of the Greek empire from Greece into Italy, where it was collated by Henry Stephens, if it is the same as the codex Stephani β. before it came into the hands of Theodore Beza. If we argue from the readings of the Codex Bezae, to the place where it was written, we may conclude, that it was written either in Syria or in Egypt; for in many instances, where it departs from all other Greek MSS. it agrees with the old Syriac, the marginal readings of the new Syriac, the Coptic version, and the quotations of Origen. We need therefore, says Mr. Marsh, make only one addition to the last mentioned hypothesis, an addition which agrees with the opinion of Dr. Semler, and we shall solve every phenomenon relative to the MS. in question: viz. that the writer of the Codex Bezae used several Greek MSS. from which he selected those readings which appeared to him to be the best; and that one of these MSS. was of the Alexandrine edition. Semler has instituted a comparison between the Cod. Cant. and the Coptic version, also with the Ethiopic, the Armenian, and the Alexandrian fathers; and the result of this inquiry is, that the Greek text of the Cod. Cant. belongs to the Alexandrine edition, and that the original from which it was copied was written in Egypt. With respect to the use that has been made of Beza's MS. we have already observed, that Stephens made extracts from it, though with no great accuracy, under the title Codex β. for the edition of the Greek Testament of 1550, and likewise Beza for his own edition, published in 1582. From his and the CLERMONT copy of St. Paul's Epistles, he published in this year his larger annotations. Since it was sent to the university of Cambridge, it has been more accurately collated by Junius. A fourth, and much more accurate collation of it was made at the instigation of Usher, and the extracts were inserted in the 6th volume of the London Polyglott. Mill collated it a fifth and sixth time; but that his extracts are likewise frequently defective and sometimes erroneous, appears from comparing them with Wettstein's New Testament, and from a new collation that was made

about the year 1733 by Mr. Dickenson of St. John's college, which collation is at present in the library of Jesus's college, where it is marked O Θ. 2. In Wetstein's extracts are also many errors, as appears from comparing them with the MS. itself. As he took a copy of it, he probably collated, not the original while he was at Cambridge, but his copy after his return. Adler in his "Versiones Syriacæ" has collated the "Versio Syra Hierosolymitana" with the readings of the Cod. Cant. and discovered in it 11 readings, that exist in no other Greek MS. now extant, 14 which are found only in one or two MSS. beside the Cod. Cant. and 54 which are common to the Cod. Cant. and several other MSS. For this reason Dr. Harwood, in his edition of the Greek Testament, published in London in 1776, has regulated his text in the Gospels and the Acts, chiefly according to the readings of the Cambridge MS. The copy which Wetstein took of Beza's MS. in 1716, is not the only transcript which has been made of it; for Simon in his preface to the "Histoire Critique du Texte du Nouv. Testament," relates, that he himself had a copy which had been sent him from Cambridge. There is also a third copy which is preserved in the library of Trinity college in Cambridge, and marked B. 10, 3. It is written on vellum, in small characters with accents and marks of aspiration. It is a large quarto, containing only the Greek text. This transcript must have been made some time in the 17th century. In the year 1787, the university of Cambridge resolved to print the whole MS. in letters of the same form and magnitude as the original hand-writing, and committed the publication to the care of Dr. Kipling. Accordingly this fac-simile was printed at Cambridge in 1793 in 2 vols. folio, under the title of "Codex Theodori Bezae, Cantabrigienfis Evangelia et Acta Apostolorum complectens, quadratis literis, Græco-Latinus." The price to subscribers was two guineas per vol. This work is printed in a splendid form: the paper is superfine; the types are admirably cut; the ink is of uncommon blackness; and the impression is scarcely paralleled. In these respects it surpasses Dr. Woide's fac-simile of the ALEXANDRIAN copy; but whether it does not yield to its Alexandrian rival in other particulars, we leave to the decision of competent judges. It is, however, a very valuable addition to the library of the Biblical critic. See Wetstein's Prolegomena to his folio edition of the New Testament, vol. i. p. 28. Kuster's edition of Mill's Testament, Proleg. p. 132. Mill Præf. in New Testament, Amst. 1735. Kipling's Pref. Michaelis's Introd. to the New Testament, by Marsh, vol. ii. iii.

There are also other MSS. at Cambridge, for an account of which see Michaelis's Introd. by Marsh, ubi supra.

CAMBRIDGESHIRE, in *Geography*, is the name of one of the inland counties of England, having parts of Northamptonshire, Huntingdonshire, and Bedfordshire, on the north-west, with Hertfordshire, and Essex on the south; Suffolk on the east; and Norfolk on the north-east. This tract of the island, with Suffolk and Norfolk, were inhabited, before the descent of the Romans, by a class of the Britons called Cenomanni, or Cenimaqui, one of the nations of the Iceni. Under the Romans, it formed a part of Flavia Cæsariensis, and the Saxons made it a part of East Anglia. After various revolutions it was incorporated in Wexsex. By the latter people it was called Grantabrygscyr, from the river Granta, which waters part of this district. The greatest length of this county is about fifty miles; its greatest breadth at the southern extremity is something more than twenty-five: its circumference is about 138. It contains nearly 443,300 acres, is divided into 17 hundreds, and has one city, six market-towns, 163 parishes, 16,451 houses, and about 89,400

inhabitants, of whom 28,054 are persons chiefly employed in agriculture, and 11,988 employed in trade, manufactures, and handicraft. The proportion of males to females is 44,081 to 45,265. The limits on the northern half are chiefly rivers and their communicating branches; on the southern, the boundaries are wholly artificial. The principal rivers of Cambridgeshire are the Ouse and the Granta, or Cam. The former enters the county between Fenny Drayton and Erith; thence it runs eastward through the fens, till, at some distance above Denny abbey, it assumes a northerly direction, and passing Stretham, Ely, and Littleport, flows into Norfolk. The latter has three branches, the chief of which rises near Ashwell in Hertfordshire; and enters this county to the west of Gilden-Morden, thence flowing to the north-east, it receives several rivulets; and near Grantchester has its current enlarged by the united waters of its sister streams, which flow into this county from Essex. Hence, taking a northerly course, it glides through the gardens of the principal colleges at Cambridge, and having passed several villages, falls into the Ouse at Hammere, in the parish of Stretham. Besides these rivers, whose channels appear to have been marked out by nature, there are numerous streams in the northern part of the county, which were suggested by the conveniences, and formed by the industry of man. These intersect the land in various directions; and by carrying off the surplus waters of the fens, have been the means of bringing many thousand acres into cultivation. The chief drains are the old and new Bedford rivers, which are navigable for upwards of twenty miles, in a straight line across the county from Erith to Denver. A considerable part of the county on the northern and north-western sides, is occupied by the fens which constitute a part of the great Bedford level. It appears from the agricultural survey of the county, that upwards of one third of Cambridgeshire, or 150,000 acres, are still in the condition of waste and unimproved fen, the average value of which is little more than four shillings an acre. This is a full proof that the immense labour employed in the draining of the level, has not been attended with the salutary effects which the promoters of the various plans too fondly imagined. The towns and villages in the northern division of the county, from the elevated spots on which they are built, appear like islands rising from the midst of low and level marshes; and the churches, being generally on the highest parts, may be distinguished at the distance of several miles. The cottages are in many places nothing more than mud walls covered with thatch. The application of the land is various. In those parts which have been preserved from the floods, or are only subject to occasional overflowings, it has all the fertility of water meadows. The crops of oats are particularly exuberant, the produce being frequently from forty-five to sixty bushels an acre. Great quantities of wheat and cole-seed are also grown, and generally with a proportional increase. Many thousand acres, particularly on the north-western side, are appropriated to pasture. In the neighbourhood of Elm, Upwell, Outwell, &c. considerable quantities of hemp and flax are grown; but the culture of these articles, as a preparation for wheat, does not receive that attention which their importance demands. Some very fine butter is made on the dairy farms in this district, and is usually sold in the Cambridge markets in long rolls, called "yards," one of which weighs a pound. The vicinity of Cottenham is famous for a peculiar kind of new cheese, of a singularly delicious flavour; the superiority of which is partly ascribed to the mode observed in the management of the dairies, and partly to the nature of the herbage on the commons. In this part of the county many
calves.

calves are suckled for the London markets. The salt marshes in the north-western corner of Cambridgeshire are remarkably favourable for the growth of corn, but from their peculiar situation, their luxuriant produce is too frequently destroyed by the floods. The south-eastern division, reaching from Gogmagog hills to Newmarket, is bleak, heathy, and thinly inhabited; being connected with that vast tract of land, which, extending southward into Essex, and northward across Suffolk into Norfolk, forms one of the largest plains in the kingdom. This is chiefly applied to sheep-walks; but some of its more fertile portions have been appropriated to the growth of barley. The south and south-western parts of the county, consisting principally of elevated land, exhibit a remarkable contrast to the northern division, and are productive of fine wheat, barley, and oats; though the heaths and commons that intersect these districts furnish sustenance to many thousand sheep, chiefly of the Norfolk, and West country breeds. The valley through which the Cam flows from Steeple Morden to Walton, is called the Dairies, from being almost wholly appropriated to dairy farms. In some of the parishes bordering on Essex, saffron is cultivated. The soil of Cambridgeshire is greatly diversified. The rich marshes in the vicinity of Wisbech, consist of a mixture of sand and clay, or silt; in the fens, of a strong black earth, or moor, lying on a gault or gravel, or turf-moor, and very favourable for the culture of oats and cole-seed; in the uplands, of chalk, gravel, loam, and tender clay, and clay upon a gault. The common manures are sometimes aided by the application of oil-cake dust, pigeons' dung decayed, woollen rags, foot, &c. The drill husbandry, till lately, had been chiefly employed at Wimpole, on the estate of lord Hardwicke, but appears to be fast spreading, and, with the introduction of some new agricultural machines, promises to become of essential service. The rent of farms is generally from 50l. to 350l. per annum; but some in the neighbourhood of Wisbech rent as high as 800l.; and one in the parish of Wood Ditton, is occupied at the rent of 1000 guineas yearly. The wood-lands are extremely small, the whole quantity appropriated to timber throughout the county scarcely amounting to 1000 acres, and these principally scattered through the parishes of Stackworth, Wood Ditton, Linton, Bartlow, Boxworth, Wimpole, and Madingley. The greatest part of the land is open field; but inclosures are rapidly taking place, new bills for that purpose being applied for, and obtained every session of parliament. Manufactures are hardly known in this county; and, with the exception of those persons who obtain subsistence by making the celebrated white bricks, and coarse pottery with the same clay, in the neighbourhood of Ely, most of the inhabitants are employed in agriculture: others derive support from spinning yarn for the Norwich weavers. Cambridgeshire, with the exception of a few parishes on the east and north-east side, which belong to the sees of Norwich and Rochester, was taken from the see of Lincoln, by Henry the First, in the year 1114, and made into a separate diocese for the newly elected bishopric of Ely. It sends six members to parliament, viz. two for the shire, two for the town of Cambridge, and two for the university; pays nine parts of the land-tax, and supplies the militia with 480 men. It is included in the Norfolk circuit.

CAMBRIN, a town of France, in the department of the straits of Calais, and chief place of a canton, in the district of Béthune; the place contains 492, and the canton 15,288 inhabitants: the territory comprehends 90 kilometres, and 18 communes.

CAMBRISOPOLIS, in *Ancient Geography*, an episco-

pal town of Asia, in the patriarchate of Antioch, and subject to the metropolis of Anazarbum.

CAMBRO-BRITISH MUSIC, national Welch tunes. These ancient melodies, which till the eleventh century seem to have been traditional, after that period, were preserved in writing. See Jones's *Musical and Poetical Relics of the Welch Bards*. These airs have a peculiar character, different from the Scotch and Irish, and are in high estimation with the natives, who have not yet forgiven the Saxons for driving them into the mountains, nor the English for slaying their bards, and robbing the principality of its independence. Most of the words which they sing to their old tunes, are narratives of their struggles for liberty.

CAMBULA, in *Botany*. (Rheed.) See *BIGNONIA catalpa*.

CAMBURG, in *Geography*, a town of Germany, in the circle of Upper Saxony, and principality of Altenburg; 28 miles W. of Altenburg, and 32 S.W. of Leipzick.

CAMBUS, in *Ancient Geography*, a river of Vindelicis, which commenced S. of Cambodunum, watered this town, and discharged itself into the Danube to the west of Gantia.

CAMBUSUM OSTIUM, the name given by Ptolemy to the most western mouth of the Ganges.

CAMBUVII MONTES, mountains of Greece in Macedonia, mentioned by Livy, who says, that the inhabitants of the country were called Volustanz. He places them below the source of Aliacmon and near Panyasus. These mountains separate the Elymiotide territory from Pelagonia.

CAMBYSENA, a country of Albania, between the rivers Cambyfes and Cyrus, and the mountains, according to Strabo. This was one of the prefectures of Armenia.

CAMBYSES, in *Biography*, king of Persia, was the son of Cyrus the Great, and succeeded his father in the year B. C. 529. As soon as he was seated on the throne, he concerted an expedition against Amasis, king of Egypt, who, as some say, had deceived him with respect to the grant of his daughter in marriage; or, according to others, because he refused, after the death of Cyrus, to pay the same homage and tribute to his successor, which he had agreed to render to Cyrus, and attempted to emancipate himself from the Persian yoke. Cambyfes made great preparations for this expedition both by sea and land: but Amasis died in the interval of four years, and was succeeded by his son Psammenitus. Cambyfes begun with the capture of Pelusium; and in order to secure his success, had recourse to the following stratagem: Being informed that the whole garrison consisted of Egyptians, he placed in the front of his army a great number of cats, dogs, sheep, and other animals, which were deemed sacred by that nation, and then stormed the city. The soldiers of the garrison not daring either to sling a dart or shoot an arrow for fear of injuring some of these animals, Cambyfes became master of the place without opposition. In a subsequent battle with the army of Psammenitus, he proved victorious, and took the king captive. Having pursued the fugitives to Memphis, he soon took the place, and because the inhabitants had massacred the herald and his retinue, whom he had sent to require their surrender, he caused as many of the prime nobility as they had destroyed to be publicly executed; and he ordered Psammenitus to be put to death. Upon this Egypt submitted to the conqueror; and the Libyans, Cyrenians, and Barceans sent ambassadors with presents to testify their subjection, and to conciliate his favour. At Sais, which was the burying place of the kings of Egypt, he caused the body of Amasis to be taken out of its tomb, and having exposed it to various indignities, he ordered it to be burnt, in direct opposition to the customs of the Persians and Egyptians. In the following

following year, which was the sixth of his reign, he determined to make war against the Ammonians and Ethiopians, and leaving his Greek auxiliaries to secure his conquests, he pursued the object of his expedition. As soon as he arrived at Thebes in Upper Egypt, he sent a detachment of 50,000 men against the Ammonians, with orders to ravage the country, and to destroy the famous temple of Jupiter Ammon; but in their passage through the desert they were overwhelmed by a deluge of sand and totally destroyed. Cambyzes himself advanced with the main body of his army towards Ethiopia; but as he had neglected to provide necessary subsistence for his numerous followers, they were soon reduced to the most dreadful indigence and distress; so that, after having devoured all their beasts of burden, and every kind of vegetable which they could find, they were under a necessity of sacrificing every tenth man as food for their companions. The king, however, for some time persisted in his mad design; but at length apprehensive of personal danger, he returned to Thebes with the shattered remnant of his large host. Here, irritated by his disappointment, he pillaged the rich and magnificent temples of the city, and set them on fire; and it is said that their wealth was such, that the remains that were saved from the flames, amounted to 300 talents of gold, and 2300 talents of silver. He likewise carried away the famous circle of gold that encompassed the tomb of king Ozymandias, which is reported to have been 355 cubits in circumference, and to have exhibited the motions of the several constellations. From Thebes he returned to Memphis, where he indulged to its full extent his naturally ferocious and savage disposition, by destroying the Egyptian priests, and the worshippers of their god Apis, and killing this sacred ox. To this outrage against humanity and the rites of their religion, the Egyptians attributed his subsequent insanity: but his general conduct both before and after this event, afforded sufficient evidence of his derangement and his cruelty. Jealous of his brother Smerdis, he ordered him to be put to death; and he then married his own sister, Meroe. Having previously consulted the Persian judges, whether any law subsisted that forbade this incestuous marriage, they, disapproving of the act, but at the same time fearful of the king's violent temper, returned this artful reply: "That they had no law indeed which permitted a brother to marry his sister, but they had a law which allowed the king of Persia to do what he pleased." This beautiful and beloved wife taking occasion to refer to the fate of her brother Smerdis, excited the rage of this brutal prince, so that he killed her, though in a state of pregnancy, by a kick in the belly. Another savage act of which he was guilty, was that of shooting to the heart the son of one of his principal officers and favourites, who had in a delicate manner reproved him for his intemperance. Having taken out the heart, which the arrow had pierced, he presented it to the father, and asked him in an insulting manner, "have I not a steady hand?" to which the abject parent replied, "Apollo himself could not have shot better." "Sceleratius," says Seneca, after reciting this story from Herodotus, "telum illud laudatum est, quam missum." About the same time, he caused several of his principal followers to be buried alive, and daily sacrificed some or other of them to his wild fury. Cræsus, who remonstrated against these proceedings, was ordered to be put to death; and those who delayed executing the royal mandate, under a conviction that the king would repent of it, were ordered to be slain, because they disobeyed his command, though at the same time he expressed his joy that Cræsus was alive. In consequence of these and similar proceedings, a conspi-

racious was formed, during the absence of Cambyzes from his own country, for seizing the throne, by Smerdis, one of the Magi, under a pretence that he was that Smerdis whom his brother had caused to be put to death. Cambyzes received this news whilst he was in Syria, on his return from Egypt to Persia: and on this occasion the name of Smerdis excited compassion and terror, whilst he recollected the fratricide he had committed. He prepared, however, for cutting off the usurper; but as he was mounting his horse for this expedition, his sword slipped out of its scabbard, and gave him a wound in the thigh, which occasioned his death in the eighth year of his reign, B. C. 522. Cambyzes is supposed to be referred to in Scripture, under the name of ACHASUERUS. Herodotus, lib. iii. Rollin's Anc. Hist. vol. ii. 177.

CAMBYSES was also the father of Cyrus, who is said by Herodotus to have been a Persian of mean extraction; but by Xenophon to have been a king of Persia. He married Mandane, the daughter of ASTYAGES.

CAMBYSES, in *Ancient Geography*, a river of Albania, which rose in mount Caucasus, and discharged itself, after pursuing its course between the Albus fluvius and the Cyrus, into the Caspian sea.

CAMBYSU, a town situate on the Red sea, in the gulf of Heropolis, near the place where the Israelites passed this sea under the conduct of Moses. Pliny says that it was situated between Nelos and Marchadas.

CAMDEBOO, in *Geography*, a loan-farm in the district of Graaf Reynet, in Southern Africa; which extends along the feet of the snowy mountains from the Drosdy to Bruyntjes Hoogté, and is chiefly composed of Karroo plains, that are, however, extremely fertile in the chasms, down which the streams of the mountains constantly flow. The oxen are large and strong, and the sheep little inferior to those of the snowy mountains. The beautiful animal, the *Gnoo*, is frequently seen bounding over the plains of Camdeboo, and spring-boks and harte-beests are very plentiful. Barrow's Africa, vol. ii. p. 374.

CAMDEN, WILLIAM, in *Biography*, an eminently learned antiquarian and historian, was born in May, 1551, in London, where his father, a native of Litchfield in Staffordshire, was a member of the company of painter-stainers. His mother was of the ancient and respectable family of the Curwens in Cumberland. After having received the first rudiments of his education in Christ's hospital, and at St. Paul's school, where he made a very conspicuous proficiency, he was entered as a servitor in Magdalen college, Oxford, at the age of 15 years; and became successively a member of Broadgate hall (now Pembroke college) and of Christchurch, depending for his support chiefly on the kindness of friends, and more particularly on that of his liberal patron, Dr. Thornton, canon of Christ church. Failing by the intrigue of the popish party to obtain a fellowship in the college of All-Souls, and to be admitted bachelor of arts, he removed to London, and prosecuted his studies under the patronage, and by the assistance of Dr. Gabriel Goodman, dean of Westminster, and his nephew, Mr. Godfrey Goodman, who supplied him with both money and books. In 1573 he returned to Oxford, and obtained the degree which he had before unsuccessfully solicited. By the interest of his friend dean Goodman, he was appointed, in 1575, second master of Westminster school, and discharged the duties of that office with great diligence, capacity, and success, so that he acquired a high degree of reputation among learned persons both at home and abroad. His leisure hours at this time were devoted to his favourite study of antiquities; and with

with a view to the great work which he afterwards executed, he began to make collections, from every source of information to which he could have access, of such materials as might serve to illustrate the history and antiquities of Britain. For this purpose he made a tour, in 1582, through some of the eastern and northern parts of the kingdom; and he also established a correspondence with persons most esteemed for their learning and judgment, both in his own country and in other nations. The first result of his researches appeared in 1586, under the title of "*Britannia, five florentissimorum Regnorum Angliæ, Scotiæ, Hiberniæ, et Insularum adjacentium ex intima Antiquitate Chrographica Descriptio*;" i. e. "Britain, or a Chrographical Description of the most flourishing Kingdoms of England, Scotland, and Ireland, with the adjacent Islands, from the most remote Antiquity," Lond. 8vo. In the dedication of this work to lord-treasurer Burleigh, Camden gratefully acknowledges the benefits he had derived from his patronage and assistance. For the further improvement of this work, which was one of the great objects of his life, he took journeys into the west of England, and also into Wales in 1589 and 1590; he consulted the archives of the kingdom; and he obtained the best information he could procure with respect to the genealogies and memoirs of ancient families; and he thus enlarged and enriched the subsequent editions of his "*Britannia*," which became so popular, that the fourth was printed in 1594, in 4to. In the preceding year he succeeded Dr. Edward Grant, who resigned the office of head-master of Westminster school. Notwithstanding his professional engagements, and his ill health, he employed the intervals that occurred in journeys of research and discovery, pertaining to his main object. He also paid due attention to his office as an instructor of youth; for in 1597 he published, for the use of his school, a Greek grammar, which, though not an original work, but an abridgment of a copious one, composed by his predecessor, Dr. Grant, was highly approved, and long continued to be a standard book. In 1601 this grammar, entitled "*Grammatices Græcæ Institutio compendiaria in usum Regiæ Scholæ Westmonariensis*," 8vo. had passed through very nearly 100 impressions. Camden seems to have been so much attached to his profession, in the exercise of which he was highly esteemed and respected, that, though he was offered the place of a master of requests, he declined accepting it. But when by the interest of sir Fulk Greville, the vacant post of Clarenceux king of arms was conferred upon him, this office was so congenial to his taste and pursuits, and afforded him so much leisure for prosecuting his favourite studies, that he surrendered his connection with Westminster school. As he was now more at liberty than when he had the charge of the school, he took a journey, in 1600, into the north, as far as Carlisle, with his friend Mr., afterwards sir, Robert Cotton; and in the same year he published an account of all the monuments in Westminster abbey, with their inscriptions, &c. In this year also appeared the fifth edition of the "*Britannia*," with an apology annexed to it, containing a reply to the objections urged against it by Rafe Brooke, York-herald. In 1603 Camden caused to be published at Frankfort, in folio, a collection of our ancient historians; some never before published, and others rendered more accurate and complete, under the title of "*Anglica, Normannica, Hibernica, Cambrica, à Veteribus descripta, &c.*;" and in 1605 appeared his "*Remaines of a greater Work concerning Britain, the Inhabitants thereof, their Languages, Names, Surnames, Emblems, wife Speeches, Poesies, and Epitaphies*," Lond. 4to. The work was dedicated to his much valued friend and patron, sir Robert Cotton; and with a view of evading such attacks as had been made upon his "*Britannia*," he depre-

ciates this collection, calling it "the outcast of a greater and more serious work, the pitifulness and silliness whereof would secure it from envy, which only reaches at eminence." Accordingly, he subscribed it only with the final letters of his name. But we have reason to believe, that, in reality, he did not think meanly of this collection, dedicated to one of his best friends, and a competent judge of its contents; and well received by the public, as it passed through several editions. Camden also composed many brief essays on British antiquities, chiefly at the request of the Society of Antiquaries, of which he was a member. Those that are still extant may be found in the collections of Thomas Hearne. In 1606 a correspondence commenced between Camden and the famous president De Thou, which continued for 11 years, till the death of the latter, and in the course of which the former communicated many useful notices concerning the affairs of Great Britain. On the discovery of the gunpowder plot, Camden was employed by king James to draw up an account of it in Latin, for the information of foreigners; and this service was performed by him in a satisfactory manner. It was published in 1607, 4to. by the king's printer, in Latin, Greek, and Hebrew: and not long after it was inserted in the list of prohibited books by the inquisition at Rome. In this year he was confined for several months in consequence of an injury received by a fall from his horse; and he employed this time in preparing for the press and publishing a final and complete edition in folio of his "*Britannia*." It was this edition that occasioned him to be distinguished as the "*Varro*," the "*Strabo*," and the "*Pausanias*" of Britain; and it was from this edition that the English translation of Dr. Philemon Holland was made in 1611, and others of later date. The "*Britannia*" remains to this day a standard work; and the translations of it in the successive editions of bishop Gibson, first published in 1693, and of Richard Gough, esq. published in 3 large vols. folio in 1789, have been swelled by corrections and additions to books of great bulk and importance. Camden, with a mind discharged from constant attention to what may be denominated his "*Opus majus*," began, in 1608, to digest the materials which he had been long collecting for a history of the reign of queen Elizabeth, to which he had been first excited by his old patron, the lord-treasurer Burleigh. Whilst he was prosecuting this work, a prospect of new preferment, as one of the professors of history in a new college of polemics, proposed by Dr. Sutcliffe to be erected at Chelsea, presented itself; but the institution, though patronized by king James, was never established. He therefore directed his whole attention to the completion of his history, the first part of which, after having been approved by king James, was printed in 1615, under the title of "*Annales Rerum Anglicarum et Hibernicarum regnante Elizabethâ ad Annum Salutis, 1589*," Lond. fol. The reputation of the author both at home and abroad was much advanced by this publication; but it did not escape animadversion; and his representation of some transactions, particularly those relating to Ireland, drew upon him some virulent attacks, to which, however, he made no reply. He closes his preface, in which he gives an account of his sources of information, and of his reason for entitling his history "*Annals*," with this memorable declaration: "Whatever it be, I dedicate and consecrate it at the altar of truth, to God, to my Country, and to Posterity." The animadversions made on the first volume discouraged the author from proceeding to publish the second part during his life; and, therefore, after finishing it in 1617, he kept the original by him, which was preserved in the Cotton library, and sent an exact copy to his friend Mr. Dupuy, who faithfully executed the order for publishing

it after his death. This history, at and after the time of its publication, has undergone some severe strictures. Some of the most candid judges, who have thought it, upon the whole, a valuable historical composition, have been of opinion, that it contains too favourable a representation of the reign of queen Elizabeth. Le Clerc, in his "*Bibliothèque Choisie*" (tom. 8. p. 139. 158.), has made some observations on what Camden has said concerning Buchanan, and Mary queen of Scots, and has shewn, that those parts of his work are written under the influence of prejudice or misinformation. He farther intimates, that Camden was misled by the good opinion he entertained of king James I. and his zeal for his service; and it appears, that his submissive loyalty led him to pay a regard to the judgment of his prince, to which it was not entitled. Dr. Robertson also observes (*Hist. of Scotland*, vol. ii. p. 388, &c.), that Camden's representation of some important transactions relative to queen Mary are very ill founded, and that this part of his history is less accurate than any other. Hume, however (*Hist. of England*, vol. vi. p. 195, 8vo.), says, that "Camden's history of queen Elizabeth may be esteemed good composition both for style and matter. It is written with simplicity of expression very rare in that age, and with a regard to truth. It would not perhaps be too much to affirm, that it is among the best historical productions which have yet been composed by any Englishman."

After the completion of his history, Camden passed his time in literary leisure and in the exercise of his heraldic office; his summers were generally spent at Chislehurst in Kent, and his winters at his house in Westminster. One of the last acts of his life was that of founding a history-lecture at Oxford; for the support of which he appropriated the valuable manor of Bexley in Kent, which he made over to the university in 1622; and he appointed Mr. Degory Wheare as the first professor. For this establishment the university, which had been slow in conferring favours upon him, when a young man, honoured him, after his death, with singular testimonies of respect. Camden died at Chislehurst in November, 1623, in the 73d year of his age, and was buried with great heraldic pomp in Westminster abbey, near the learned Casaubon, and over against the celebrated Chaucer. Near the place was erected a monument of white marble, with his effigies to the middle, and in his hand a book with "*Britannia*" inscribed on the leaves; under which there is an elegant inscription. As an antiquarian, Camden's character has been long established; so that he may be justly reckoned as the father of British antiquities, and the materials which he collected have served as a basis for the accumulation of further knowledge on the subject. His merits as an historian have been already stated. For the elegancies of literature he is said to have had a taste, so that he wrote Latin verse with purity and harmony. Bishop Gibson, in his life of Camden, has given a concise sketch of his character in the following words: "In his writings he was candid and modest, in his conversation easy and innocent, and in his whole life even and exemplary." But neither his extensive learning, nor his high reputation, could defend him from the envy of his enemies while living, or his memory from insults after his death. *Biog. Brit.*

CAMDEN, in *Geography*. See CAMDEN.

CAMDEN, or CAMDEN, a county of North America, in Edenton district, North Carolina, situate in the N.E. corner of the state. It has 4033 inhabitants, including 1038 slaves. Its chief town is Jonesborough.

CAMDEN, a district of the upper county of South Carolina, bounded by Cheraws district on the N.E., Georgetown district on the S.E., and the state of North Carolina

on the N., and divided into the following counties, *viz.* Clarendon, Richland, Fairfield, Claremont, Lancaster, Kershaw, and Salem. It is 82 miles from N. to S. and 60 from E. to W., and contains 38,265 inhabitants, including 8865 slaves. It is watered by the Wateree, or Catabaw river, and its branches: the upper part is variegated with hills, generally fertile and well watered. It produces Indian corn, wheat, rye, barley, tobacco, and cotton. The Catabaw Indians live in the northern part of this district.

CAMDEN, the chief town of Camden district, in South Carolina, is seated on the E. side of Wateree river, 35 miles N.E. of Columbia, 55 S.W. of Cheraw, 120 N. by W. of Charlestown, and 643 S.W. of Philadelphia. It is a regular town, and contains about 120 houses, an episcopalian church, a court-house and gaol. The navigable river on which it is situated, enables it to carry on a brisk trade with the back country. N. lat. 34° 20'. W. long. 80° 38'.

CAMDEN, a county in the lower district of Georgia, at the south-east corner of the state, on St. Mary's river, containing 305 inhabitants, of whom 70 are slaves. The chief town is St. Patrick's.

CAMDEN, a small post-town on the western side of Penobscot bay, in the district of Maine, and the south-easternmost township of Lincoln county, having Thomas-town on the S.W.; 35 miles N.N.E. from Pownalborough, and 228 miles N.E. from Boston.—Also, a village in the county of Kent, and state of Delaware, about four miles S.W. from Dover, and five north-westerly from Frederica.

CAMEA. See CAMÆA.

CAMECHIA, in *Ancient Geography*, the name of a town in Albania, mentioned by Ptolemy.

CAMEHUIA. See CAMAIEU.

CAMEL, in *Geography*. See ALAN and CAMELFORD.

CAMEL, *mount*, lies on the W. coast of New Zealand, in the South Pacific Ocean, and is remarkable on account of the land that is contiguous to it being mostly low and barren; and as it is near the north end, it is seen in almost every direction, the island being, in this part, very narrow. The observed latitude is 34° 20' S.

CAMEL, in *Mechanics*, a kind of machine used in Holland for raising or lifting ships, and invented by Bakker, a burgomaster of Amsterdam, in the year 1688, or 1690. It took the denomination from its heaviness or strength.

Its use is to raise vessels, in order to bring them over the Pampus, which is a passage between two sand-banks, opposite to the mouth of the river Y, about six miles from the city of Amsterdam, where the shallowness of the water hinders large ships from passing. On this account, vessels which are outward-bound, take in before the city only a small part of their cargo; and they receive the rest when they have passed the Pampus. For the same reasons, those which are homeward-bound, must, in a great measure, unload before they enter it. Many measures were adopted to prevent the accumulation of sand in this passage; but they were ineffectual. About the year 1672, they had no other remedy for this evil besides that of fastening to the bottoms of ships large chests filled with water, which was afterwards pumped out, so that the ships were buoyed up, and rendered sufficiently light to pass the shallow. By this method, the Dutch carried out, with the utmost difficulty, their numerous fleet to sea in the above-mentioned year. This plan, however, gave rise, soon after, to the invention of the camel, by which the labour was much facilitated. This machine consists of two half-ships, built in such a manner that they can be applied, below water, on each side of the hull of a large vessel. On the deck of each part of the camel there

There are a great many horizontal windlasses; from which ropes proceed, through openings, in the one half, and, being carried under the keel of the vessel, enter similar openings in the other, from which they are conveyed to the windlasses on its deck. When they are to be used, as much water as may be necessary is suffered to run into them; all the ropes are cast loose; the vessel is conducted between them; and large beams are placed horizontally through the port holes, with their ends resting on the camel, on each side. When the ropes are made fast, so that the ship is secured between the two parts of the camel, the water is pumped from it; and it then rises, and raises the ship along with it. Each half of the camel is generally 127 feet in length; the breadth, at the one end, is 22 feet, and at the other, 13. The hold is divided into several compartments, that it may be kept in equipoise, while the water is flowing into it. An East India ship, that draws 15 feet of water, can, by the help of this machine, be made to draw only 11; and the heaviest ships of war, of 90 or 100 guns, can be so much lightened as to pass without obstruction, over all the banks of the Zuyder-zee.

Leopold ascribes the invention of this machine to Cornelius Meyer, a Dutch engineer, who, towards the end of the 17th century, was invited to Rome by the Apostolic chamber, to cleanse the Tiber, and render it navigable. In a work entitled, "*L'Arte di restituire à Roma la trasfasciata Navigazione del suo Tevere*," Rom. 1683, fol. and describing his inventions, he proposes a method for carrying large ships over shallows, which bears a considerable resemblance to that in which the camel is employed; for he says, that a vessel must be constructed in such a manner as to embrace the hull of the ship, like a case; and that when placed under the ship, it will raise it up. But though this machine of Meyer is founded on the same principles with those of the camel, it is different, as it consists of one piece, and can be placed under a ship only in a dock, by the help of a number of screws. It does not appear that Meyer's machine was ever tried or employed. On the other hand, we are assured, on the testimony of Bakker, the original inventor of the camel, recorded in 1692, and still preserved, that in the month of June, when the water was at its usual height, he conveyed, in the space of 24 hours, by the help of his machine, a ship of war, 156 feet in length, from Enkuyfen hoort to a place where there was sufficient depth; and in 1693, he raised a ship six feet by the help of this machine, and conducted her to a place of safety. At later periods, the Dutch invention has been employed in other countries. The Russians use camels to carry ships over the shoals that are formed in the Neva; and they have them of various sizes. Bernouilli saw one, each half of which was 217 feet in length, and 36 in breadth. Camels are likewise used at Venice. Ships of war, however, to which this machine is applied, must unavoidably sustain injury; and it is well known, that the ports of a ship which had been raised by the camel, were so much strained, that they could not afterwards be closely shut. The principle upon which this machine acts, so as to answer the purpose, is that of specific gravity. Muschenbroek's *Introd. ad Phil. Nat.* vol. ii. p. 520. Beckmann's *Hist. Invent.* vol. iii. p. 337, &c.

CAMEL, in *Zoology*. See CAMELUS.

CAMEL-bird, in *Ornithology*. See CAMELUS.

CAMEL's-hay, in *Botany*. See ANDROPOGON.

CAMELANI, in *Ancient Geography*, a people of Italy in Umbria, who, according to Hardouin, inhabited the town called *Camilianum*.

CAMELEON, in *Zoology*. See CHAMELEON.

CAMELEON, CHAMELEON, in *Astronomy*, one of the constellations of the southern hemisphere, near the pole, and invisible in our latitude. The stars in this constellation, according to Sharp's Catalogue, are ten.

CAMELFORD, in *Geography*, is a very ancient, but inconsiderable borough-town of Cornwall, England, situated in a dreary, bleak, and almost desolate part of the county: like most of the Cornish boroughs, it has scarcely any other claim to public notice, than the privilege of returning two members to parliament. These are elected by the mayor, burgesses, and freemen, which do not exceed 20 persons. It began to send members in the reign of Edward VI., and this liberty was confirmed by Mary. It was made a borough by a charter from Richard duke of Cornwall, (when he was king of the Romans,) who granted it a market and a fair. These privileges were afterwards confirmed by his brother Henry III. It was incorporated by Charles I. The whole town contains only 100 houses; and the parish-church is at Lanteglos, about one mile distant. This neighbourhood has been, according to the statement of many historians, the theatre of two desperate battles; one between the Britons and the Saxons, and the other between the famous British Pen-dragon, Arthur, and his nephew Modred, or Medrawd, who, after an adulterous intercourse with Arthur's queen Guenora, rebelled against his uncle, and fought to deprive him of his kingdom. The war lasted several years, and various battles were fought; but the decisive conflict at length occurred at Camlan, (probably Caben-alan, the crooked river) where, after two days' engagement, with uncommon slaughter, Modred was killed, and Arthur himself mortally wounded. See ARTHUR. The site of the battle is disputed by different historians; though, from some local circumstances, we are inclined to fix it near the village of Camel, which is within sight of Glastonbury abbey, in Somersetshire. Camelford is 228 miles west from London; and has a market on Friday.

CAMELIDES, in *Ancient Geography*, islands of the Mediterranean Sea, on the coast of Asia Minor. Pliny places them on the coast of Ionia, in the vicinity of Miletum.

CAMELINA, in *Botany*, (five *Myagrum*. Dod. pempt. 532. Lob. ic. 224. Venten. iii. p. 14. C. sativa, Crantz. Aust.) See *MYAGRUM sativum*.

CAMELINA (*Myagrum alterum*. Lob. ic. 225.) See *ERYSIMUM Cheiranthoides*.

CAMELIOMAGUS, in *Ancient Geography*, a place of Italy, in the northern part of Liguria, to the west of Placentia.

CAMELITA, Bos, in *Zoology*. See BISON.

CAMELLIA, in *Botany*, (named in honour of George Joseph Kamel, a Jesuit, whose name has been latinized into *Camellus*. He is the author of *Syllabus Stirpium in insula Luzone Philippinarum*, annexed to the third volume of Ray's *Historia Plantarum*) Linn. gen. 843. Schreb. 1145. Willd. 1302. Juss. 262. Vent. 2.447. Class and order, *monadelphia polyandria*. Nat. ord. *Columniferae*, Linn. *Aurantia*, Juss. *Ebenaceae*, Vent.

Gen. Ch. *Cal.* perianth many-leaved, imbricated: leaves roundish, very blunt: the inner ones gradually larger, deciduous. *Cor.* petals five to seven, large, inversely egg-shaped, adhering at the base. *Stam.* filaments numerous, erect, coalescing below into a crown larger than the style, unconnected above, shorter than the corolla; anthers simple. *Pist.* germ roundish; style awl-shaped, the length of the filaments; stigmas from three to five, acute. *Peric.* top-shaped, woody, furrowed, with as many cells as furrows, separated by very slender partitions. *Seeds*: nuts one or two in each cell.

Ess. Ch. *Calyx* many-leaved, imbricated; innerleaves larger. Sp. 1. C. *japonica*. Japan rose. Linn. Sp. 982.

F

Thunb.

Thunb. Japan. 272. Jacq. ic. rar. 3. Tab. 553. Curtis, Mag. 42. Lam. Illust. Pl. 594. (Tsubakki. Kämp. amén. Tab. 851, 852. *Thea chinensis flore roseo*, Pet. gaz. Tab. 33. fig. 4.) "Leaves acutely serrated, acuminate." A lofty, large, evergreen tree. *Trunk* covered with an ash-coloured bark; branches round and smooth. *Leaves* alternate, egg-shaped, acute, shining on both sides, thick and stiff, paler green beneath, on short petioles. *Flowers* large, beautiful, those of the plants which have been raised in Europe, lively red, but in their native country they exhibit a variety of colours, nearly sessile, generally solitary, but sometimes two or more together; petals thickish, uniting at the bottom into a tube full of nectareous juice; stamens about fifty. Stigma unequally five-cleft. Its flowers readily become double, in which state they often occur in Chinese paintings. A native of China and Japan, introduced into England before 1742 by Robert James lord Petre. It was for a long time very scarce, and as it bore a high price, was generally treated as a stove plant, but Mr. Curtis observes, that it appears a very proper plant for the conservatory, and may hereafter, probably, be treated as a laurifolia or magnolia. It is propagated either by layers or cuttings. Petiver considered it as a species of tea-tree, to which it is certainly nearly allied. 2. *C. fasanqua*, Thunb. jap. 273. Kämpf. amén. 853. "Leaves obtusely serrated, emarginate." A tree of a middling size. *Stem*. much smaller, and more slender than that of the preceding species. *Leaves* thinner and narrower. *Flowers* many times smaller, solitary, terminating the branches; calyx of five or six leaves; petals from five to seven, snow-white, deciduous. The leaves dried in the shade have a sweet smell, and are mixed with tea to give it a grateful odour: a decoction of them is used by the women to wash their hair with. This species so resembles the tea-plant, that it is distinguished chiefly by the coalescing stamens, and this, as Thunberg observes, is scarcely a sufficient mark of distinction, since the stamens coalesce only at the base, and sometimes seem to be distinct. A native of Japan. The Chinese call this plant "Chahwah," or flower of tea. It yields a nut, from which is expressed an esculent oil, equal to the best which comes from Florence. On this account, it is cultivated in great abundance; and is particularly valuable from the facility of its culture in situations fit for little else. See Sir George Staunton's Embassy to China, vol. ii. p. 467. He has given a drawing of the plant. 3. *C. drupifera*, Lour. Coch. 141. "Leaves oblong-egg-shaped, slightly scolloped; flowers two or three together, terminating; drupes four-celled." A middle sized tree with spreading branches. *Leaves* acuminate, smooth, hard, small, alternate, petioled. *Flowers* white; petals eight, oblong, emarginate: style quadrifid, the length of the stamens. *Drupe* roundish, with a grooved, four-celled nut, and roundish kernels. The fruit is equal in size to the walnut, and is not much unlike it, but is not esculent. The oil expressed from the nuts is used by the natives to anoint their hair, and for various medical purposes; it has a pleasant odour, and does not soon become rancid. A native of Cochinchina. This plant is taken up by professor Martyn as a camellia, from Loureiro; but Bosc asserts, that its botanical characters are far remote from those of this genus, and with his usual parsimoniousness, gives no further observation on this subject.

CAMELOBOSCI, in *Ancient Geography*, a people of Asia, placed by Ptolemy in Carmania, and surnamed Soxotæ.

CAMELOPARDALIS, in *Zoology*, a genus in the PECORA order of MAMMALIA, instituted by Gmelin, on the authority of late writers, for the reception of that curi-

ous animal the Giraffe, or Camelopardi. The character of the genus, as laid down by this author, consists in having the horns very simple, covered with skin, and terminated by a tuft of black hair; the fore teeth in the lower jaw eight in number, broad, thin, and the outer one on each side deeply bilobate.

Linnaeus describes this creature in the twelfth edition of his *Système Naturel*, as a kind of cervus, or deer, under the specific title of *Camelo-pardalis*; a name by which it was known among the earlier Latin writers, as Strabo and Opius. Linnaeus was not singular in considering the giraffe as a sort of cervus; he had the example of Gesner, and other nomenclators before him. Gesner affirms (as he tells us), on the credit of Belon, one of the earliest among modern naturalists, who has attended particularly to this animal, that the giraffe sheds his horns like the deer. Buffon complains that no such passage as Gesner quotes is to be found in any part of Belon's works; but be this as it may, Linnaeus was misled by this and other accounts of the animal to believe it must be of the deer kind. Since the time of Linnaeus, naturalists are become better acquainted with this animal: it has been discovered, that the horns are not deciduous as in the deer, or at least there is every reason to think they are not. These horns are of a texture altogether different, not only from those of the animals of that kind, but from all the other known kinds of horned quadrupeds. Anatomists observe, that these horns are only porous bony excrescences, forming, as it were, a part of the skull, a pretty strong proof that they are not deciduous, and cannot be shed like the horns of the deer.

From the structure of these horns, and the peculiar arrangement of the teeth, it is clear the giraffe is an animal of another genus distinct from that of cervus, in which Linnaeus places it. Gmelin removes it from the cervus genus, in the last edition of the *Système Naturel*, to that of *Camelo-pardalis*, where it stands at present a solitary example of this curious genus.

One of the latest and most satisfactory describers of the giraffe is M. Vaillant. The discoveries of this ingenious writer, who, in the progress of his travels through Africa, had frequent opportunities of seeing them in their native haunts, has thrown new light upon their history. His observations are interesting, and he has, besides, rendered an important service to science by enriching one or two of the principal museums of Europe with specimens of the animal; from whence the naturalist is enabled to form his own opinion of this remarkable animal, unbiassed by the reports of inattentive observers, or the imperfect details of former travellers. A specimen of the giraffe, in excellent preservation, said to be shot by Vaillant, adorns the museum of the late Mr. John Hunter in London, from which we may be capable of conceiving no very inadequate idea of the majesty of this gigantic animal, when ranging at large in the wilds of its native forests: even now one cannot contemplate it without astonishment. "If height alone constituted precedence among quadrupeds (observes M. Vaillant), the giraffe would undoubtedly claim the first rank, measuring when full grown near seventeen feet from the top of the head to the fore feet." In this passage, however, Vaillant speaks only of the male, the female being smaller. Sonnini fully confirms the testimony of Vaillant in respect to the vast height of the giraffe, observing, that they sometimes attain to the height of seventeen or eighteen feet. Vosmaer goes further, and declares that some very respectable inhabitants of the Cape of Good Hope assured him they had seen and killed giraffes, which, including the horns, were 22 Rhinland feet in height, or nearly twenty-three feet of our measure.

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sure. Impartially considering, however, all that has been said on this subject by writers in general, we may allow fifteen or sixteen feet to be the common height of this animal.

Thus it appears, admitting the lowest calculation, that the giraffe is one of the tallest animals in nature, and every account we have of it tends to prove that it is as sociable and inoffensive in its manners as it is beautiful in appearance. Oppian gives a good description of it. "The camelopardalis (says this writer) has some resemblance to the camel: it has a spotted skin like the panther, and a neck as long as the camel; its head and ears are small: its feet broad, and legs long, but the last are very unequal, the fore ones being much longer than those behind, which are so short, that when the animal is standing it has somewhat the appearance of a dog seated on its haunches." He also speaks of two prominencies upon the head just between the ears, which resemble two small and straight horns, and of the tail being short and tufted at the end, with black hairs. Heliodorus and Strabo both describe it in nearly the same manner. Strabo tells us it was called camelopardalis, although it bears no resemblance to the panther, as the skin is not spotted in the same way; he likewise mentions the docility of its disposition, and that it feeds on vegetables. According to Pliny, it was first exhibited by Cæsar the dictator in the Circæan games. It was afterwards more frequently introduced. We are told, that in the time of the emperor Gordian, no less than ten were shewn at once. Aurelian exhibited it, among other remarkable animals, in his triumph on the conquest of Palmyra. Heliodorus speaks of its being brought, among other presents, by the Ethiopian ambassadors to Rome. It is represented among other rare animals on the Prænestine pavement, made by the direction of Sylla, and is expressed both in its grazing and browsing attitudes.

Among modern writers, the first good description of it we meet with is that of Belon. "I have seen," says he, "an animal in the castle of Cairo, which is commonly called *zurnapa*; the Latins anciently stiled it *camelo-pardalis*, a name compounded of leopard and camel, for it is sprinkled with spots like the first, and has a long neck like the latter. It is a beautiful molded animal, as gentle as a lamb, and more sociable than any other wild beast. Its head is almost like that of the stag, excepting its size, and it has two small horns on the head, covered with hair: and those of the male are longer than those of the female." Its neck, he further tells us, is long, straight, and slender: its horns round; its legs thin and long, but so low behind, that the animal appears as if seated. The colour of the hair on the body, he describes, as being white and red. When grazing, it is obliged, he says, to spread its fore legs very wide, and even then feeds with great difficulty; it is, therefore, he infers, that the giraffe prefers to feed on the leaves of trees rather than to graze in the fields, especially as its neck is exceedingly long, and can reach to a great height.

The description Gellius affords us of the giraffe is still more satisfactory. This writer saw three camelopards at Cairo, which he thus describes: on their heads are two horns six inches long, and in the middle of their forehead a tubercle rises to the height of about two inches, which appears like a third horn. This animal is sixteen feet high when it holds up its head. Its neck alone is seven feet, and it is twenty-two feet long from the tip of the nose to the end of the tail; its fore legs are nearly of an equal height, but the thighs before are so long in comparison to those behind, that its back inclines like the roof of a house. Its whole body is sprinkled with large yellow spots, which are

nearly of a square form. Its feet are cloven like the ox; its upper lip hangs over the under; its tail is slender, with hair on it to the very point: it ruminates like the ox, and, like that animal, feeds upon herbage: its mane extends from the top of the head to the back. When it walks it seems as if both sides were alternately lame, and when it grazes, or drinks, it is obliged to spread its fore legs prodigiously wide." This last passage in Cellius's account is contradicted by Vaillant, who asserts, it can even drink from a river the surface of which is lower than the bank on which it stands; and this account of Vaillant, M. Vosmaer (formerly director of the stadtholder's collection of natural history) observes, is confirmed by considering the structure of the neck, the vertebræ of which are connected with those of the back by a strong ligament.

Antonius Constantius, a writer of the fifteenth century, gives an account of a giraffe he saw at Faro, which he says was so gentle that it would eat bread, hay, or fruit, out of the hand of a child, and that when led through the streets, it would take whatever food of this kind was offered to it by the spectators. Vaillant confirms this character of the giraffe: he says it is of a mild and harmless disposition, and when attacked endeavours merely to save itself by flight, running, according to this writer, with great swiftness, though in a somewhat peculiar and awkward style, on account of the length of its neck, and breadth of its fore parts, compared with the hind. Vaillant chased one of these animals on full speed on horseback, but the animal on turning a small hill, was soon out of sight; the dogs, however, came up with him, and he was obliged to stop and defend himself, which he endeavoured to do by kicking in a forcible manner, and Vaillant was so fortunate as to kill the animal at a single shot. Mr. Gordon relates, that a giraffe which he had wounded, suffered him to approach it as it lay on the ground, without offering to strike with its horns, or shewing any inclination to revenge itself: he even stroked it over its eyes several times, when it only closed them, without any signs of resentment. Its throat was afterwards cut for the sake of its skin, and when in the pangs of death it struck the ground with its feet, with a force much exceeding that of any other animal; and these seem to be its principal means of defence.

The male and female giraffe resemble each other when young, but as the animal advances in age, the spots on the male become dark-brown, while those of the female continue of a ferruginous cast: the latter is, however, said to acquire the dusky shades of the male when very old. The tubercle on the forehead, which occurs in both sexes, is smaller on that of the female than the male, and the female has also four teats as in the cow. According to Vaillant, the teeth in the giraffe, thirty-two in number, are situated thus: six grinders on each side, both above and below: no front teeth in the upper jaw, but eight in the lower. The horns, both from their size and form, says M. Vosmaer, seem intended merely for ornament: they appear to be excrescences of the os frontis. These consist of a porous bony substance, covered externally with short coarse bristly hair: they terminate abruptly in a flattish or slightly convex head, but little wider than the other parts of the horn, and are edged with stiff bristles all round the outline. The hoofs are moderately large and black. All the accounts we have of the giraffe agree in representing its hind quarters as about two feet and a half lower than its withers; but from observations made by professor Camper on the complete skeleton of the animal formerly in the collection of the prince of Orange, it would appear, that naturalists have been mistaken in this particular. That its fore legs are longer than its

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hinder legs is true, but the difference is not more than seven inches, which, in a height of seven feet, is of small consequence. It may, however, be rendered apparently more considerable by the obliquity of the thigh bone with respect to the tibia, when compared with that of the humerus to the radius.

The giraffe is chiefly a native of Ethiopia,* but there are other parts of Africa, and of Asia likewise, which this interesting animal inhabits. At the Cape of Good Hope they seem to be not very uncommon. They are also found as far in the interior of Africa as Senegal, but not, as some say, in Guinea, or any of the western parts, nor very far to the southward. These animals are sometimes seen in small groupes to the amount of six or seven together, and when disturbed, run off with great celerity. They are principally found in forests living on herbage of various kinds, but chiefly on the foliage of trees: there is a species of mimosa, in particular, which the natives of the Cape call *kannap*, and the Dutch colonists, *kameel-doorn*, which the giraffe is remarkably fond of. The Hottentots affirm, that the female goes twelve months with young, and has never more than one foal at a time. The flesh they deem excellent, and often hunt and kill them for the sake of food, and for the skin of the animal, the latter of which forms a thick and durable kind of leather. In Arabia, the giraffe is known by the name of *sirapha*, and *zurnaba*, or *zurnapa*.

CAMELOPARDALUS, in *Astronomy*, a new constellation of the northern hemisphere, formed by Hevelius, consisting of 32 stars first observed by him, situate between Cepheus, Cassiopeia, Perseus, the two Bears, and Draco, and containing 58 stars in the British Catalogue.

CAMELUS, in *Entomology*, a German species of SCARABÆUS, described by Olivier and Fabricius; the thorax of which is four horned; shield somewhat bicornuted behind; body black. Obs. The female has a double transverse carinated line on the scutell, the posterior one of which is largest.

CAMELUS, in *Ornithology*, *Struthio Camelus*, the black, or common ostrich. This is specifically distinguished from the other species of STRUTHIO, by having only two toes to each foot. Linn. &c.

The ostrich is, without doubt, says Dr. Latham, the largest bird in the creation; it is near eight feet in length, and, when standing upright, is from six to eight feet in height. A specimen of this bird, nearly as large, is preserved in the Leverian museum. We have also seen in the menagerie, at Exeter Change, a living ostrich rather larger. Two ostriches were shewn in London in the year 1750, the male of which, it is recorded in the Gentleman's Magazine, was ten feet in height, and weighed three hundred weight and one quarter. This last is the largest bird of the kind we ever heard of. The ostrich has a small head not much unlike that of a goose; the bill is also somewhat similar, but less depressed, and four inches and a half in length, horn colour, with the tip dusky. The irides are hazel; eye-lids beset with hairs; the head, and greatest part of the neck, are bare of feathers, and of a flesh colour, with a few scattered hairs. Lower parts of the neck and body are covered with black feathers, which are singularly loose in their webs, and totally unlike those of any other bird; the quill-feathers, and those of the tail, are snowy white, long, and beautifully waved, with the tips of some few of them black. On each wing are two spurs about an inch in length, and on the breast is a callous, bare, and hard substance, serving the bird to rest on when it first bends forward to sit on the ground: thighs and sides of the body naked: legs strong, greyish brown, and furnished with two claws, the outer one

of which is very short, and without a claw. The female differs in having those feathers brown, which in the male are black.

This bird inhabits Africa, and those parts of Asia that lie contiguous to it, but appears to be most abundant about the Cape of Good Hope. The egg is as large as a child's head, and capable of containing better than five pints of liquor. The female is supposed to lay nearly fifty eggs in a season; from sixteen to twenty is the amount of those usually contained in a single nest, according to Dr. Sparrman. These the female ostrich buries in the sand, where, it is the common opinion, they are hatched by the heat of the sun, the female taking no further care of them after once depositing them in safety; but this is contradicted, in a great measure, both by Kolben and Sparrman. Kolben tells us the male and female sit on them by turns, and that he has seen them hatching their eggs hundreds of times, and as often driven them off, and taken their eggs to feast himself and his friends; one of which would prove a meal for three or four persons; and besides this, they are said to be very good. Dr. Sparrman thinks, the male and female sit on the eggs by turns, as in one of his journeys, in the month of December, he frightened a male from the nest, which was made only on the bare sand, on which the eggs lay scattered and loose, and were eleven in number. Buffon allows, that the ostrich scarcely ever loses sight of the eggs, but asserts, that it is only in the more northern parts that the female has occasion to sit on them, the sun being alone sufficient to hatch them in the torrid zone. Kolben says, the young ones cannot run when first hatched, but are supplied with grass and water by the old ones. The adult birds are endowed with great strength.

Ostriches feed on vegetables, and besides which they are frequently observed to swallow various other substances. Old nails, and other bits of iron, lead, copper, or glass, are alike indiscriminately taken into the stomach of this voracious bird. It is a vulgar notion, however, that the ostrich can eat such substances; that they swallow them is clear, but it would be the height of absurdity to imagine they can digest them; nor do they always swallow them with impunity, as they are liable to many accidents, from their promiscuous manner of feeding, and the swallowing of iron and other such substances sometimes proves fatal to them.

The natives of those parts which the ostrich inhabits most commonly take them by hunting. They follow the birds at a distance for two or three days, when the birds, fatigued, by being perpetually harassed, and wanting time to take food, are very easily overtaken, and killed with their clubs. Other ostrich hunters conceal themselves in the skin of one of those birds, and by that means approach near enough to surprise them. It is also usual to hunt them on horseback with dogs, and after overtaking them to approach so close as to apply the hooked end of a staff round their legs, which throwing them down they may be either taken alive, or knocked on the head immediately.

The capture of these birds is an object of consequence to the Africans. Ostrich feathers are in request for ornamental purposes in all parts of the world, and form an article of commerce between the Africans and European powers. The skin of this bird is very thick, and being of a durable nature is a good substitute for leather. The flesh is eaten by the Hottentots, and the eggs are in esteem both with the Africans and European settlers. The egg-shells answer for drinking cups and other utensils, and are often mounted in gold or silver for that purpose. They are hard and durable, and, when fine, are not greatly inferior to ivory.

East

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East both the shell of this bird, and that of the cassowary, are administered as medicine.

CAMELUS, or *Camel*, in *Zoology*, a genus of quadrupeds, which, in the Linnæan system of animals, stands in the PERCORA order of his class MAMMALIA. The character of this genus consists in having no horns: the front teeth in the lower jaw six, rather thin, and broad: caninæ or canine teeth distant, three in the upper jaw, and in the lower two: upper lip cleft or divided.

Zoologists discriminate several species of the camel tribe, independently of those animals which are known in Europe by the appellation of the Arabian camel, or dromedary, and the Bactrian camel. Gmelin speaks of five, making altogether, with the two preceding, seven species, namely, *Camelus dromedarius* of Linnæus, the common, or Arabian camel: *Camelus bactrianus*, Linn. the bactrian camel: *Camelus glama*, the llama, or lama: *Camelus guanaco*, the guanaco, huanaco, or allo-camelus of Gesner: *Camelus arcuatus*, the chilihucque, or Peruvian sheep of some authors: *Camelus vicugna*, the vicuna; and *Camelus paco*, the paco, or pacos of Pennant.

The first species, *Camelus dromedarius*, is distinguished by having only one bunch, or protuberance, on the back. The general height of this camel, measured from the top of the dorsal bunch to the ground, is about six feet and a half, but from the top of the head when the animal elevates it not much less than nine feet: the head, however, is usually so carried as to be nearly on a level with the bunch, or rather below it, the animal bending the neck extremely in its general posture: the head is small; the neck very long; the body of a long and meagre shape: the legs rather slender, and the tail, which is slightly tufted at the extremity, reaches to the joints of the hind legs: the feet are very large, and are hoofed in a peculiar manner, being divided above into two lobes, not reaching through the whole length of the foot; and the extremity of each lobe is guarded by a small hoof: the under part of the foot is covered with an extremely strong, tough, and pliable skin, which, by yielding in all directions, enables the animal to travel with peculiar ease and security over dry, hot, stony, and sandy regions, which would soon parch and destroy the hoof. On the legs are six callosities, viz. one on each knee; one on the inside of each fore leg, on the upper joint, and one on the inside of each hind leg, at the bottom of the thigh. On the lower part of the breast is also a large callus or tough tubercle, which is gradually increased by the constant habit which the animal has of resting upon it in lying down.

One cannot be deceived as to the native country of the camel, says the energetic Buffon, when we consider the nature and structure of these animals; they are the natural inhabitants of the burning deserts of Arabia, from whence they have been gradually diffused over the rest of Africa and Asia. It has been tried, but without effect, to multiply camels in Spain; they have also in vain been transported to America, but they have succeeded neither in one climate nor in the other, and they are seldom to be met with in the East Indies beyond Surat and Ormus. It is not absolutely to be said, that they cannot subsist and increase in the East Indies, Spain, America, or even in colder countries in Europe, by keeping them during winter in warm stables, feeding, and treating them with care; not allowing them to labour, or suffering them to walk out but when the weather is fine, they may be kept alive, and we might even hope to see them multiply, but their offspring will be necessarily small and languid. They lose, therefore, all their value under the influence of our climates, and instead of becoming useful, the rearing of them is attended with much fruitless

expence; while on the contrary, in their native country, they may be said to compose all the wealth of their masters. Camels have constituted the riches of Arabia from the earliest ages of the world: the modern Arabs estimate their wealth by the number of these useful animals.

The camel is venerated by the Arabs as the gift of Heaven, as a sacred animal, without whose aid they could neither subsist, trade, nor travel. They also eat its flesh, especially that of the young camel, which they reckon excellent. The hair of these animals, which is fine and soft, and is renewed every year, serves them to make stuffs for their cloathing and furniture. Bled with their camels, they not only want for nothing, but they fear nothing. In a single day they can traverse a tract of fifty leagues into the desert, and thus escape the reach of their enemies. All the armies in the world, says Buffon, would perish in the pursuit of a troop of Arabs: figure to yourself, for instance, observes this writer, a country without verdure, and without water, a burning sun, an air always clear, plains of sands, and mountains still more parched, over which the eye extends without perceiving a single animated being; a dead earth perpetually tossed by the winds, presenting nothing but bones, scattered flints, rocks perpendicular or overthrown; a naked desert where the traveller never breathes under a friendly shade, where nothing accompanies him, and where nothing recalls to mind the idea of animated nature; an absolute solitude, infinitely more frightful than that of the deepest forest; for to man trees are, at least, visible objects; more solitary and naked, more lost in an unbounded void, he every where beholds the extended space surrounding him as a tomb: the light of the day more dismal than the darkness of night, serves only to give him a clearer idea of his own wretchedness and impotence, and to present before his eyes the horror of his situation, by extending round him the immense abyss which separates him from the habitable parts of the earth; an abyss which in vain he would attempt to traverse, for hunger, thirst, and burning heat haunt him every moment that remains between despair and death. The Arab, nevertheless, by the assistance of his camel, has learned to surmount, and even to appropriate these frightful intervals of nature to himself. They serve him for an asylum, they secure his repose, and maintain his independence. But man never uses any thing without abuse. This same free, independent, tranquil, and even rich Arab, instead of regarding his deserts as the ramparts of his liberty, pollutes them with his crimes. He traverses them to carry off gold and slaves from the adjacent nations. He employs them for perpetrating his robberies, which unfortunately he enjoys more than his liberty. An Arab, who destines himself to this kind of piracy, is early accustomed to the fatigues of travelling, to want of sleep, and to endure hunger, thirst, and heat. With this view he instructs, rears, and exercises his camels. A few days after their birth, he folds their limbs to remain on the ground, and in this situation he loads them with a pretty heavy weight, which is never removed but for the purpose of replacing a greater. Instead of allowing them to feed at pleasure, and to drink when they are thirsty, he regulates their repasts, and makes them gradually travel long journies, diminishing at the same time their quantity of food. When they acquire some strength, he exercises them to the course; he excites their emulation by the example of horses, and in time renders them equally swift and more robust. At length, when he is assured of the strength, fleetness, and sobriety of his camels, he loads them with whatever is necessary for his and their subsistence, departs with them, arrives unexpectedly at the confines of the desert, robs the first passenger he meets, pillages the straggling habitations,

tions, loads his camels with the booty, and if pursued is obliged to accelerate his retreat. It is on these occasions that he unfolds his own talents and those of his camels: he mounts one of the fleetest, and conducting the troop, makes them travel night and day, almost without stopping either to eat or drink; and in this manner he easily passes over the space of three hundred leagues in eight days. During all that time of fatigue and travel he never unloads his camels, and only allows them an hour of repose, and a ball of paste each day. They often run in this manner for eight or nine days, without meeting with any water, and when by chance there is a pool at some distance they scent the water, even when half a league from it. Thirst makes them redouble their pace, and they drink as much at once as serves them for the time that is past, and for as much to come, for their journey often lasts them several weeks, and their abstinence continues till their journey be accomplished.

Throughout Turkey, Persia, Egypt, Arabia, Barbary, and various other contiguous countries, all kinds of merchandize are carried by camels, which of all conveyances is the most expeditious, and attended with the least expence. Merchants and other travellers assemble, and unite in caravans to avoid the insults and robberies of the Arabs. These caravans are often numerous, and are always composed of more camels than men. Each camel is loaded according to his strength, and when overloaded he refuses to proceed, remaining in his resting posture till his burden is lightened. Large camels generally carry from a thousand to twelve hundred pounds weight, and the smallest from six to seven hundred. In these commercial travels their march is not hastened; as the route is often seven or eight hundred leagues, their motions and journies are regulated. They walk only, proceeding at the average rate of ten or twelve leagues each day. Camels that form a part of these mercantile caravans, unlike those of the predatory Arabs, it is affirmed, are relieved from their load every night, and allowed to feed at liberty; and in a country where they find abundant pasture they eat in one hour sufficient to ruminate for a whole night, and to nourish them for twenty-four hours. But it is seldom they meet with such pasturage; neither is this delicate food necessary for them. They even seem to prefer wormwood, thistles, nettles, furze, and other prickly and thorny vegetables to the softest herbs, and so long as they can find herbage they can easily dispense with drink. With qualities of such general utility, in passing over the dreary regions of the deserts these valuable animals possess no ordinary share of sagacity. They are said, indeed, to be extremely sensible of injustice and ill-treatment. The Arabs assert, that if a person strike them without cause, he will not find it easy to escape their vengeance, and that they will retain the remembrance of it till an opportunity offers for gratifying their revenge, having in this point a striking similarity of character with their Arab masters. It is said, that in their fits of rage they sometimes take up a man in their teeth, throw him on the ground, and trample him under their feet. Eager of revenge, they retain, however, no longer any rancour, when once they are satisfied, and it is even sufficient if they believe they have gratified their revenge. Accordingly we are told the crafty Arab, when he has by chance excited the rage of a camel, will lay down his garments in some place near which the animal must pass, and dispose them in such a manner, that they appear to cover a man sleeping under them. The camel knows the garments of him by whom he has been treated with injustice, seizes them with his teeth, shakes them violently, and tramples on them in a rage. When his anger is appeased by this means, he leaves them, and then the owner of the dress may make his appearance without fear,

and load and guide, wherever he pleases, the animal, who submits with astonishing docility to the will of a man, whom just before it was his wish to destroy. "I have sometimes seen *badjins*, or dromedaries, in Upper Egypt, (writes Sonnini,) weary of the impatience of their riders, stop short, turn round their long neck to bite them, and utter cries of rage. In these circumstances the rider must be careful not to alight, as he would infallibly be torn to pieces; he must also refrain from striking his beast, which would only increase his fury. Nothing can be done but to have patience, and appease the animal by patting him with the hand, which frequently requires some time, when he will resume his way and his pace of himself. The pace of these dromedaries is a very long trot, during which they carry the head high, and the tail stretched out stiff in a horizontal position." The saddle, or rather pack-saddle, on which the rider sits, Sonnini describes as being hollowed in the middle, and having at each saddle-bow a round piece of wood, placed vertically, which he grasps firmly with each hand to keep himself in his seat. Some of the saddles are more simple, not so well stuffed, and less commodious than those of the Arabs, and the handles of the saddle-bows are horizontal. These are brought from Sennaar, the capital of Nubia. A long pocket suspended on each side to hold provisions for the rider and his beast; a skin of water for the rider alone, as the dromedary can travel a week without drinking, with a leather thong in the hand to serve as a whip, are the whole of the traveller's equipage: and thus equipped he may cross the deserts, travelling fifty, or even fourscore leagues a day! if this writer can be relied upon. This mode of travelling is fatiguing to excess; the loins are broken by the rough and quick shaking of the dromedary's pace; the hands are soon galled, and become painful; and the burning air which you divide with rapidity impedes the breath, so as almost to induce suffocation. The most extraordinary journey of this kind Sonnini ever heard mentioned, was made by a Bedouin, who was pointed out to him at Cairo. He had travelled from that city to Mecca, a distance of more than 400 leagues, in five days, a journey for which the caravan of pilgrims employ upwards of thirty days. When the traveller is not in haste, or accompanies a caravan, the progress of which is always slow on account of the camels of burden, a kind of covered litter is fixed on one of these animals for his accommodation, in which he is tolerably at his ease, and may even sleep if so disposed. Women usually travel in this manner, sometimes five or six together in a litter.

The ancients believed that the dromedary had a natural antipathy to horses. Xenophon asserts this; and Pliny repeats it on the credit of Xenophon. Others have said that they entertain an equal aversion for asses and mules. But the truth appears to be precisely the contrary; for all these animals, at least in Egypt and Turkey, live and travel together. Sonnini affirms that there is always an ass at the head of a file of loaded camels, to whom he officiates as leader, the first of the camels being fastened to the ass, and following him step by step. Others have agreed in the assertion that camels must not be beaten too much, or on improper occasions, which would soon make them turn restive; but the drivers of the loaded camels have a stick with which they beat them, and they who ride upon camels, whip them with a long strap of leather. They are also urged on with a clicking of the tongue, much like that employed by us in Europe to inspirit our horses. It is proper likewise to remark, while on this subject, that the Bedouins never whistle, and that it gives them pain if a traveller, ignorant of their customs, should whistle in their company. Sonnini is persuaded that even when the Arabs sing on their march, their

object

object is not to encourage the camels to proceed, but to beguile the tediousness of their journey. Should this opinion be founded in fact, it must entirely destroy the veracity of Buffon, and several other writers, who tell us the camels in their march require neither the spur nor whip, but when they begin to be tired their courage is supported, or rather their fatigue is charmed, by singing or by the sound of some instrument. Their conductors, we have been told by travellers, relieve each other in singing; and when they want to prolong the journey, they give the animals but an hour's rest; after which, resuming their song, they proceed on their march for several hours more, and continue to sing till they arrive at the next resting place.

The mode of the camel's walk, as described by Aristotle (*Hist. Anim. lib. ii. cap. i. p. 480. Casaubon. Lugdun. 1590.*) is by raising the two legs of the same side, the one immediately after the other; not moving the legs diagonally, in the manner of most other quadrupeds. When he accelerates his pace, it is in the same manner as a horse ambles; though to the rider ten times more jolting than the hardest trot of a horse. *M. Niebuhr* informs us, in his "*Travels through Arabia, &c.*" that he measured the distances of places, by counting the steps of the camel, and comparing the number with the time in which they were travelled by his watch. In the *Philosophical Transactions* (vol. lxxxi. part. 2. for 1791) we have an ingenious Memoir "On the rate of travelling, as performed by camels, and its application, as a scale, to the purposes of geography," by *James Rennell, esq.* He observes, that the rate of the camel's movement appears to him to be, beyond all others, the least variable, whether we examine it by portions of days or of hours. Accordingly he examined five journals of gentlemen who had crossed the deserts between Aleppo, Bagdad, and Bassorah; viz. that of *Mr. Carmichael*, in 1751, that of *Colonel Capper* in 1778, that of *Mr. Hunter*, in 1767, that of *Mr. Holford*, in 1780, and that of *Mr. Irwin*, in 1784; and after comparing in various ways the data which these journals afford, he concludes, that the hourly rate at which a camel travels, as deduced from *Mr. Carmichael's* journey, is 2.475 British miles; from *Col. Capper's*, 2.51; from *Mr. Hunter's*, 2.585; from *Mr. Irwin's*, 2.48; and from *Mr. Holford's*, 2.5; and that the mean of the five experiments gives 2.51 British miles for the rate at which camels travel in an hour; which may therefore be taken at $2\frac{1}{2}$ miles, British measure. *Mr. Rennell* further remarks, that it does not appear, from these journals, that the load of a camel has any influence on its speed, when it is suffered to go at its own rate, as it always is in caravans: the only way in which the load affects the camel's travelling is, that the animal will not travel for so long a time when fully laden, as it will when light. For the benefit of those, who, in the interior part of Africa, may not be provided with watches, *Mr. Rennell*, by comparing the number of days in which each of the five journeys, as well as one made by *Teixera*, across the Chaldaean desert, were performed, with the whole number of hours which elapsed during their journeys, has deduced the following circumstances; viz. that the heavily loaded caravans, which were accompanied by *Mr. Carmichael*, *Mr. Holford*, and *Teixera*, travelled, on a medium, in each day, for $7^h 10'$, $7^h 40'$, and $7^h 30'$, respectively; and that the light caravans of *Mr. Irwin*, *Mr. Capper*, and *Mr. Hunter* travelled, in each day, on a medium, for $9^h 12'$, $8^h 38'$, and $8^h 45'$, respectively:—the mean of the three former is $7^h 27'$, and of the latter $8^h 52'$; consequently, reckoning the rate of travelling of camels, in caravans, to be $2\frac{1}{2}$ miles in an hour, the distance travelled by the heavy caravans, in a mean day, will be 18.625 British miles, and by the light caravans $22\frac{1}{6}$, so that hence, any traveller, who is in pos-

session of a pocket compass, to point out the direction in which he travels, and can tell what that was, and the number of days employed by the caravan in going from one place to another, may contribute, very considerably, to the improvement of the eastern geography. See CARAVAN.

The facility with which the camels abstain from drink in their journeys over the burning deserts is more remarkable than their abstinence from food; and it is so extraordinary, that, according to *Leo Africanus*, they are capable of remaining without drink for 15 days without prejudice to their health; but after long abstinence, it is said that they are apt, on their first meeting with water, to drink so greedily that it proves suddenly fatal to many of them. This facility does not proceed from habit alone, but is rather, as *Buffon* observes, the effect of their structure. Independently of the four stomachs, which are common to ruminating animals, the camel is possessed of a bag which serves him as a reservoir to retain water. This fifth stomach is peculiar to the camel: it is so large as to contain a great quantity of water, where it remains without corrupting, or intermixing with other aliments. When the animal is oppressed by thirst, or has occasion for water to macerate his dry food in ruminating, he causes part of the water to ascend into his stomach, or even as high as the throat, by the mere contraction of certain muscles. It is by virtue of this conformation that the camel is enabled to pass several days without drinking, and to take at any one time a prodigious quantity of water, which remains in the reservoir pure and limpid, because neither the liquors of the body nor the juices of digestion can mix with it. There can be no doubt that the water preserved by the camel in this receptacle remains perfectly pure, all writers agreeing in this particular; it is no very uncommon circumstance in passing through the deserts for travellers to kill a camel in order to obtain a supply of water from this receptacle when they are destitute of this necessary article, and cannot procure it in any other manner. The loss of a camel, on such an occasion, is of the less consideration, as the flesh affords the traveller and Arabs a rich repast, independent of the advantage of being supplied with water; instances of this occur in *Bruce's* travels to discover the source of the Nile, and various others.

That water, in cases of emergency, is taken from the stomach of the camel, is a fact neither doubted in Syria, nor thought strange. In proof of this fact, it is hardly necessary to allege the testimony of an Arab historian (*Beidawi*) who, in his account of the prophet's expedition to Tabuc against the Greeks, relates, among other distresses of the army, that they were reduced to the necessity of killing their camels for the sake of the water contained in their stomachs. *Sale's Koran*, p. 164. *Gibbon's Decl. of the Rom. Emp.* vol. v. p. 245. However, *Mr. John Hunter*, who dissected a camel, saw no reason for assigning more than four stomachs to this animal; though he could conceive that water might be found in the paunch little impregnated by the dry provender of the desert, and readily separating or draining from it. *Mr. Home* also, who assisted at the dissection, and who prepared the different stomachs in a dry state for the purpose of shewing their internal structure, and communication with one another, inferred, from this preparation, that the number of stomachs is four, as in other ruminating animals; so that it cannot be said that there is a distinct reservoir for water; but the second stomach has a very peculiar structure, being made up of numerous cells, several inches deep, with their mouths uppermost, and orifices apparently capable of muscular contraction. When the animal drinks, says *Mr. Home*, it probably has a power of directing the water into these cells, instead

instead of letting it pass into the first stomach, and when these are filled, the rest of the water will go into the first stomach. In this manner a quantity of water may be kept separate from the food, serving occasionally to moisten it in the passage to the fourth or true stomach. The testimony of travellers to water being found in the stomach, and Daubenton, upon dissection, meeting with it in the second stomach, when compared with the structure of the parts, seem to confirm the above conjecture. See Russell's Nat. Hist. of Aleppo, vol. ii. p. 426.

If we reflect on the dissimilarity of this animal to other quadrupeds, Buffon conceives that we cannot doubt but his nature has been considerably changed by constraint, slavery, and perpetual labour. Of all animals, says he, the camel is the most ancient, the completest and most laborious slave. He is the most ancient slave, because he inhabits those climates where men were first polished. He is the most complete slave, because in the other species of domestic animals, as the horse, the dog, the ox, the sheep, the hog, &c. we still find individuals in a state of nature, and which have not submitted to man. But the whole species of the camel is enslaved, for none of them exist in their primitive state of liberty and independence. Lastly, he is the most laborious slave, because he has never been nourished for pomp like most horses, nor for amusement like most dogs, nor for the use of the table like the ox, the hog, and the sheep; because he has always been made a beast of burden, whom men have never taken the trouble of harnessing or yoking in machines, but have regarded the body of the animal as a living carriage, which they may load or overload even during sleep, for when pressed, the load is sometimes not taken off, but the animal lies down under it with his legs folded, and his body resting on his stomach. Buffon expatiates in this passage with considerable animation on the severity of the servitude to which this useful animal is condemned, but the degraded picture he has drawn, it must be allowed, admits of some alleviation. It is not in all countries it inhabits that the camel is dealt thus rigorously with; there are many parts in which he is held in greater favour, and treated with more indulgence than this lively writer intimates. That the camel is kept for pomp as well as utility in various parts of Asia and Africa, is certain. Many authors speak to this effect. Mr. Bruce frequently saw them saddled and harnessed in Africa. Sonnini speaks of them as highly useful for the saddle. In the east they are oftentimes richly caparisoned for the service of the great. In China, a particular breed of them is trained like our race-horses for the course, and for the performance of journeys that require expedition. Camels are also instructed sometimes for warlike purposes. Mr. Bruce describes the arrival of the caravan from Syene escorted by 400 Ababdé, or fighting men, all upon their camels, each armed with short javelins. The manner of their riding he thought more whimsical than calculated to inspire terror; there were two small saddles on each camel, one suspended on each side of the animal, so that the two ababdé on each camel sat back to back, a mode which in their practice of fighting he allows may be convenient enough, but had they ventured to contend with the European travellers every ball might have killed two instead of one. The camels, however trained by the Egyptians for war and for the saddle, were found of considerable service in the French armies for the use of their dismounted cavalry, when they lately invaded Egypt. So far, indeed, from the camel being always treated with the rigour Buffon describes, and never being harnessed or yoked in machines, as he affirms, the testimony of every traveller contradicts it. We know that in Tartary the camel is regarded with as much, if not more attention than the horse. Opulent

Tartars, according to Pallas, take a pride in conveying their families from place to place, or in travelling to town in covered waggons drawn by camels; the yoke is placed between their neck and the first dorsal bunch (for it is a variety of the Bactrian camel they possess), and is of a peculiar construction adapted for the purpose. These are seldom used as beasts of burthen, but are often yoked to the large four-wheeled waggons or *Madshari*, especially on bad roads and during winter. In armies Pallas conceives they would be serviceable both as beasts of burthen, and in putting to flight any cavalry, the horses of which are unaccustomed to the sight of these curious animals. And indeed the Russians begin to be aware of the value of the camel for the purposes of war. In the year 1796 no less than a thousand camels were bought up in Crim Tartary for the use of the army in Persia. In Russia the price of a full grown camel is generally from 100 to 150 roubles, or from 22l. 10s. to 33l. 15s. sterling. The Egyptians keep large numbers of camels, which are bred and sold by them to the Arabs. They fetch a pretty high price. At Cairo, according to Sonnini, they are worth 4 or 500 livres each, which is about the lowest average price they bear in Russia. But in Upper Egypt they are not so dear; their price varying from 2 to 300 livres. They are equally numerous in Barbary, but they become more scarce towards the western coasts of Africa. Among other hardships endured by the camel, Buffon complains, that it is never nourished for the table like the ox, the hog, or the sheep; another assertion by no means well founded: when by mischance they have met with any accident that is likely to incapacitate them for the burthen, they are commonly fattened and killed for this purpose. We frequently hear of the lame camels being butchered for use. Mr. Bruce and his party were frequently regaled with a comfortable meal of camel's flesh stewed, and he speaks of it as an ordinary circumstance on any occasion of feasting or rejoicing in Africa to kill a young camel, and serve it up to table. The Jews disseminated over the eastern, or African parts of the world, do not eat the flesh of the camel, because they are expressly forbidden by the Mosaic laws (Levit. chap. xi. ver. 4.), but the Arabs, and the other inhabitants of Egypt, &c. with the exception of the Christians, consider it as a dainty and wholesome food. A curious circumstance is mentioned by Sonnini respecting this: in those cities, he tells us, where the fanaticism of the Mahometans is at the highest pitch, as in Cairo and Alexandria, it would be deemed a profanation to sell the flesh of the camel to the Franks, who, however, on their part, are by no means desirous of it, for, though it has no disagreeable flavour, it is hard and dry. In Barbary camels' tongues are salted and smoked for exportation to Italy, and other countries, and these form a very good dish.

Besides the highly beneficial properties of the camel for the saddle, as a beast of burthen, for the yoke, and as wholesome food, the camel possesses others not less valuable. Its hair is an important article of commerce, and serves likewise for the fabrication of the tents and carpets of the Arabs, and for wearing apparel: rich shawls are made of the hair of camels that are in much request. The Tartar women manufacture a narrow sort of cloth of it which is used of its natural colour: a broad cloth is, or at least was formerly produced from the same material at the manufactory of *Novorossisk*, or *Ekatérinoflav* in the Crimea. Curious cloths are also formed of it in Persia at this time. It is known by the French in trade, under the improper name of "Laine de Chevron." The most esteemed is brought from Persia by the caravans of Erivan, Tiflis, Erzerum, and Tocat. There is some of three qualities; the black, the red, and the gray. The black is the dearest; and the gray is worth only

only half the price of the red. Some of it is brought annually to Marfeilles by way of Aleppo, Smyrna, and Constantinople. This last city exports from 80 to 100 bales, weighing about 300 pounds the bale. Smyrna and Aleppo send a much more considerable quantity. This kind of wool is employed in the manufacture of hats; and is purchased by all the European nations that trade to the Levant. The French, however, consume the greatest quantity of it. The English employ but a small quantity of the black, which they procure at Smyrna. Olivier's Travels in the Ottoman Empire, p. 223. The dung of the camel is used as fuel, and in Arabia the milk of the females affords one of the simple and salutary aliments of the Bedonius.

The camel that carries Mahomet's standard, which the caravan of pilgrims offer yearly on the tomb of their prophet, is exempted the rest of its life from all services. It is even pretended that this happy beast will rise again at the general resurrection, and enjoy the pleasures of paradise.

The general aspect of the camel, at first sight, is apt to impress the mind with the idea of deformity; and in particular the dorsal bunch has the appearance of some accidental protuberance rather than a truly natural conformation. This idea seems to have operated so powerfully on the mind of Buffon, that he has not scrupled to advance an opinion that this part, as well as the pectoral bunch, was originally produced from ill usage in constantly loading the animal with heavy burthens, and that having once arisen, it has been transmitted by descent, and continues to form a permanent character. In confirmation of this theory, he insists, that although these callosities are to be met with in every camel, yet they plainly prove that they are not natural, but are produced by excessive constraint and pain, from being often found filled with pus. "The breast and legs, therefore, (continues this writer), are deformed by these callosities; the back is also disfigured with a single, or double hunch; and both these hunches and callosities are perpetuated by generation. As it is evident the first deformity proceeds from the custom of forcing them when quite young to lie on their stomachs, with their legs bent under them, and in that cramped posture to bear not only the weight of their own body, but also the burthens which are put upon them, it must be presumed that the hunch, or hunches, owe their origin to the unequal compression of heavy burthens which are put upon them, and have raised the flesh, and puffed up the fat and skin; for these hunches are not bony, but composed of a fleshy substance, partly of the same consistency as the udder of a cow. Thus the callosities and the hunches should be equally regarded as deformities produced by the continuance of labour and constraint of body; and though at first accidental and individual, are now become general and permanent in the whole species. It may also be presumed that the bag which contains the water, and which is only an appendage to the paunch, has been produced by a forced extension of this viscus. The animal after enduring thirst for a long time, taking at one time as much and perhaps more water than the stomach could contain, this membrane would become extended and dilated, as has been observed in the stomach of sheep, which extends and acquires a capacity in proportion to the quantity of its aliment. The stomach is very small in sheep that are fed with grain, while in those that are fed on herbage it becomes very large." "These conjectures, (Buffon allows) however, would be fully confirmed or destroyed, if any of these animals could be found wild to compare with the domestic; but these animals do not exist any where in a natural state, or if they do, no one has yet remarked or described them; and we must therefore suppose that all which is good and

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fair, about them they owe to nature, and that which is defective and deformed is occasioned by the labour and slavery imposed on them by the dominion of man." The Bactrian camel, or that with two dorsal bunches, is, however, said to be found wild in the desert parts of Asia between India and China, and to be larger than the domesticated animal, and should this be true, the reasoning of Buffon falls to the ground. What he has advanced may apply in some measure to the callosities on the legs, or to that on the breast, all which may arise from the cause he assigns; but with respect to the accidental production of the dorsal protuberance, his conjecture appears improbable. We have every reason to believe that those bunches cannot be formed from the superabundance of nourishment, although they may be inflated, and appear more plump from this cause: those bunches in long journeys where they are stinted for food, it is said, diminish gradually, and are reduced so flat at last, that their places are only discovered by the length of the hair, which is always longer on these parts than on the rest of the back; but the other parts of the body waste in a similar manner at the same time, and when the animals are fattened again, as they acquire flesh in other parts, those dorsal bunches resume their former bulk. So that upon the whole we are persuaded those dorsal bunches are natural both for this reason, and because throughout all the varieties of the two most frequent kinds of camel, the Arabian and Bactrian, one race is constantly distinguished by having no more than a single dorsal bunch, and the other two. Were these bunches the effect of accident or of heavy pressure only, we should certainly find nature less constant in this particular.

The ancients have said that these animals are in a condition for generation at the age of three years; but this is doubtful, since they have not at that age attained to above half their growth. The young camel sucks its mother 12 months; and when designed for labour, to make him strong and robust, they leave him to suck or graze for a longer time; nor do they attempt to load him or put him to work till he has attained the age of four years. The camel commonly lives 40 or 50 years, but seldom longer. The labouring camels are generally geldings, as they leave but one male for eight or ten females; they are without doubt weaker than the males, but they are more tractable, and ready for employ at all times. The males, on the contrary, are not only ungovernable but even furious in the rutting time, which continues for the space of 40 days, and returns every spring. At this season they emit frequently a kind of hoarse lowing, with a strong rattling in the throat; they continually foam, and one or two red vesicles, as large as a hog's bladder, and of a disgusting appearance, hang out of their mouths. They are extremely dangerous at such times; it is said that in their fits of rage, they will sometimes take up a man in their teeth, throw him to the ground, and trample him to death. The female goes 12 months with young, and like other large quadrupeds produces but one at a birth.

It is remarkable that the dromedary of which we have been speaking is the only sort of camel found in Egypt. If we follow the distinction made by Aristotle and Pliny, and repeated by Buffon, (says Sonnini), between two species of animals which nature has discriminated by a constant, and very striking mark, there are no camels in Egypt. In fact, there is no animal of that kind which has two bunches on the back (*Camelus Bactrianus*, Linn.); all that are found in this country have only one, and are consequently of the dromedary species. The Arabic word *djemmel*, which answers to camel, is likewise the only one used by the inhabitants of Egypt for that breed, which is the most common, most useful,

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CAMELUS.

ful, of greatest size and strength, heavy of foot, and employed for carrying burthens. On the contrary, that which is less tall and bulky, and possessed of great agility, is called dromedary by the Europeans, and *badjin* by the Arabs, because it is the animal which the *badjis* or pilgrims usually ride. Sonnini likewise mentions a smaller kind of camel in Egypt which is much less known, and of which he only saw a few among the Bedouins; they are of a shorter make than the common sort; their body is more round; they are not so tall; their hair is longer and thicker, and they are of a fallow colour inclining to brown.

In conclusion of this article we may adopt the words of Buffon: by uniting under one point of view all the qualities of this animal, and all the advantages which are gained by him, he must be acknowledged to be the most useful of all creatures under subordination to man. Gold and silk are not the true riches of the East; the camel is the treasure of Asia. He is of greater value than the elephant, as he does as much labour, and does not consume a twentieth part of the food. Besides, the whole species is subject to man, who propagates it and multiplies it as much as he pleases. But he has no such dominion over the elephant, which he cannot multiply, and the individuals of which he cannot conquer without more trouble and difficulty. The camel is not only of greater value than the elephant, but is perhaps equal in utility to the horse, the ass, and the ox, when their powers are united. He carries as much as two mules, though he eats less, and feeds on herbs as coarse as those the ass will eat. The female furnishes milk longer than the cow; the flesh of young camels is as good and as wholesome as veal: the hair is finer, and in more request than the finest wool. Even their excrements are useful, for sal ammoniac is made of their urine; their dung, when dried and powdered, serves them for litter, as well as for the horses with whom they frequently travel in countries where neither hay nor straw is to be obtained. Their dung (chopped and intermixed with straw) forms an excellent fuel, burns freely, gives a clear and nearly as hot a flame as that of dried wood, and which is of great use in the deserts, where not a tree is to be seen, and where, for the want of combustible materials, fire is as scarce as water.

There are several varieties of this kind of camel differing in size, strength, colour, and other slight particulars, as in our different breeds of horses, and other domesticated animals; and there are likewise hybrid varieties produced between this and the following species. It should be further stated, to prevent confusion, that the dromedarius of Gesner is not the same animal as Jonston describes in his history of quadrupeds by that name; the latter means the Bactrian, or two bunched camel. Knorr follows this writer, calling the Bactrian camel Dromedar, Trampelthier oder Dromedar; but this, as already shewn, is not the true dromedary. Forskall distinguishes the Arabian camel, our present species, and dromedary of modern authors, by the title of *Camelus vulgaris*: it is *Camelus* of Jonston; and *Camelus Dromas* of Gesner.

On medals, the camel is the symbol of Arabia, when found on the coins of any other nation. Thus, on a medal of the gens Plautia, we find a woman's head with a mural crown, *A. Plautius Aed. Cur. S. C.* and on the reverse, *Judeus*; and in the exergue, *Bacchius*; the device, a man on his knees holding with his right hand a camel by the bridle, and with the left, a branch of palm. It also denotes alliance with Arabia.

CAMELUS Bactrianus, the Bactrian camel, and Le Chameau of Buffon, a species known from the preceding by

having two dorsal bunches. Pallas calls it the Tauridan camel.

This kind attains in the peninsula of the Crimea to a larger size than among the Kalmuc Tartars. Pallas observed them in that country of a white and yellowish white colour, and sometimes of a blackish colour; but these last were less frequent than the others. If we may credit Sonnini, this sort is not to be found in Egypt, where they alone rear, and cultivate that kind which we denominate the Arabian camel. It is the Tauridan camel that generally prevails in Russia and Siberia; the mild winter of the Crimea in particular is very favourable to the habits and propagation of this animal. This is the camel which authors mention as still existing in a state of nature, in the deserts of the temperate parts of Asia, more especially in those between China and India, and which is reported to be larger than the domesticated race. The Arabian camels are beyond comparison more numerous, and universal than this kind, which is chiefly confined to some parts of Asia; a moister soil and more temperate climate being more congenial to its habits than the hot and parched regions of the African deserts, which the Arabian camel inhabits. It has acquired the name of Turkish camel from being found in Turkistan, and some other parts of the Levant. From Pallas it may be seen that the Tauridan camel is more common in various districts of the Russian territory than is generally conceived. They rarely employ this creature like the Arabian camel as a beast of burthen, but train it for the saddle, and for drawing travelling waggons, and similar machines in the manner Europeans train horses. This animal thrives best in the milder parts of Tartary; but it bears even the severity of a Siberian climate, being found in the vicinity of the Baikal lake, where we are told the Mongols and Burats keep great numbers of them. Here they are said to live during winter on willows and other trees, a diet affording little nourishment, and in consequence of which they become lean and meagre towards the latter part of the winter season. In April they lose their hair, and go naked all May amidst the frosts of that severe climate. They thrive best in dry grounds, and among the salt marshes. This animal is cultivated in China, where they have a breed of peculiar swiftness, that bears the expressive name of *Fong Kyo Fo*, or camels with feet of wind. See the article *BACTRIANUS*.

CAMELUS Glama, the LAMA, is the third species in the Linnæan genus *camelus*. The modern French naturalists constitute a distinct genus of the lama, *camelus glama* Linn. the huanaco, *camelus huanacus*, and *camelus lama* of Erxleben; pernichcatl of Fernandez; and guanaco of Ulloa. With those naturalists the lama forms the second section of ruminating animals, and is characterised as having from four to six incisive teeth in the lower jaw; the fissure in the upper lip; the length of the neck; and absence of the dorsal bunches. This division of the *camelus* so far as relates to the species *glama* is not objectionable: the absence of the dorsal bunches would form a good generic distinction; but in adopting it, we ought certainly to exclude the species *huanacus*, or guanaco, that animal being remarkable for the gibbosity of the back. It may, however, be better to retain the lama tribe with that of the *camelus* till we are better acquainted with those animals; for it is not to be disguised that an inexplicable confusion prevails among writers with regard to some of them. They are all natives of South America, and are at best but imperfectly known to the naturalists of Europe. Even in following the best authorities, when treating of them, we are not entirely without suspicion that

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that no great dependence ought to be placed on the characters hitherto assigned to some of those species. It is not improbable that some of those which are at present considered as distinct species may hereafter prove to be only varieties of the rest.

The *Lama* is distinguished by having a bunch on the breast, and the back smooth, *Linn.* This animal described by several old naturalists under the name of *Ovis Peruviana*, or Peruvian sheep, is found in most parts of South America, but is most plentiful in Peru, where it inhabits, in a wild state, the highest and coldest parts of the mountains, feeding in numerous herds, and flying with great rapidity on the sight of mankind. The general size of the glama is nearly that of a stag, measuring four feet and a half in height to the top of the shoulders, and about six feet in length from the nose to the tail. The neck is of great length: the head small: the back slightly elevated; and the whole animal bears some resemblance to a camel, on a small scale. Its general colour is a light ferruginous brown, paler or whitish on the under parts, and sometimes it is said to be varied or patched with darker and lighter shades on different parts, and to have a black stripe down the back to the beginning of the tail. The hair on the wild animal is long and shaggy. On the breast is a protuberance, from which is observed to exude a yellowish kind of oily secretion. The voice of the glama resembles the shrill neighing of a horse. When angry or attacked, it strikes with its feet, endeavours to bite, and at the same time ejaculates from its mouth a quantity of saliva, which is commonly asserted to be of a caustic or acrimonious nature, and to excite a slight inflammation of the skin, but Molina thinks this observation destitute of truth.

Buffon is persuaded that the lama, or glama of the Peruvians is the same animal as those people call guanaco, or luanaco, the former being altered from its primitive appearance by domestication. Molina is entirely of a different opinion, and we have recently had an opportunity of ascertaining that the Peruvians do themselves consider these two animals distinct, and are well acquainted with both kinds in a wild state, as well as that of domestication. It is singular, as Buffon remarks, that although the lama, and two or three other analogous animals are bred in Peru and Mexico, as the horses are in Europe, or the camels in Arabia, we scarcely know any thing concerning them; and notwithstanding the Spaniards have had possession of those vast countries for above two centuries, not one of their authors has given us an accurate history, nor any exact description of them. It is affirmed that they cannot be transported into Europe, nor even brought from their heights but at the risk of their lives in a short time. But this is not entirely true: it is certain that after the conquest of Peru, some of them were transported into Europe. The animal spoken of by Gesner under the name of *allocamellus*, and of which a figure is given in his work, is of the lama family, (guanaco) and was brought alive from Peru to Holland in 1558. In 1777 there was a living lama in the veterinary school of Alfort, the same no doubt from which Buffon took his description of this animal. It was remarkable for the mildness of its manners and disposition. When ranging at large it seldom walked, but proceeded in a sort of trot or gallop. This animal subsisted on herbage, and has been known to neglect drinking for the space of six months together, so abundant was the saliva with which the mouth was constantly moistened.

Peru, according to Gregoire de Bolivar, is the native country of the lamas: they have been conveyed into other

provinces, but more for the sake of curiosity than utility. In Peru, from Potosi to Coracas, these animals are in the greatest numbers: they constitute the chief riches of the Indians, and add not a little to the wealth of the Spaniards. Their flesh is excellent food, having the flavour of mutton. Their wool may be spun into beautiful cloathing; and they are capable of carrying heavy loads in the most rugged and dangerous ways. The strongest of them will travel with from one hundred and fifty, to two hundred and fifty pounds weight on their backs: their pace is slow, and their journey is seldom above fifteen miles a day; but though slow in their progress, they are sure-footed, easily descending precipices, and travelling safely amongst the most craggy rocks, where men can scarcely accompany them. They commonly travel for about five days together, and are then obliged to rest for two or three days before they resume their journey. They are constantly employed in the mine territory for conveying the Peruvian ores over the rugged hills and narrowest passes of the Andes. Bolivar affirms, that in his time, above three hundred thousand of these animals were kept in constant employment by these means. A Peruvian drawing lately brought to England, in which an Indian cavalcade is represented, exhibits two figures of those animals laden with bars of silver, according to the costume of that country: each lama bears two of these bars which are suspended in a sort of saddle, one on each side of the animal.

The growth of the lama is very quick, and its life is but of short duration. At the age of three years it couples, and remains strong and vigorous till twelve, after which it begins to decline, and becomes entirely useless at the age of fifteen. In their nature they appear modelled after that of their Indian masters; they are gentle and phlegmatic, performing every thing with the greatest leisure and caution. When they stop on their journey to rest, they bend their knees very deliberately in order to lower their body without disturbing their load, and when they rise again at the command of their driver's whistle, it is performed with the same precaution: when wearied no blows can provoke them to proceed. They feed as they go along on the grass they meet with in their way; but they never eat in the night, making use of that time to ruminate. When they sleep or ruminate, they rest with their feet folded under their bellies. If overloaded or too much fatigued they sink down, and will not rise again though the driver should beat them with the utmost force; and if the driver continues his torments, the animal grows desperate, and destroys himself by beating his head against the earth.

This animal may be truly considered as the camel of Peru. Even before the discovery of South America by the Spaniards, the lamas were domesticated, and employed as beasts of burthen by the Peruvians. At present they are preferred to horses by travellers passing over the mountainous regions of this part of the world. Cozer, who lately made a journey of observation in Peru, tells us the Spaniards harness them, and employ them for the conveyance of merchandise in the same manner as the Peruvians did in former days. A good lama cost him eighteen ducats; but the ordinary price is from twelve to thirteen ducats each. The flesh of the young lamas is excellent; that of the old ones is dry and tough. The wool is valuable: the Indians make shoes of the skin, and the Spaniards use it for harness. These useful and even necessary animals in the country they inhabit are attended with no expence to their masters; as they are cloven footed, they do not require shoes, and their wool renders saddles unnecessary. Satisfied with a small portion of vegetables, or grass, they want neither corn nor hay; and

they are still more moderate in what they drink, as their mouths are continually moistened with saliva, which they have in greater quantity than any other animal.

The lamas Buffon supposes to be confined to that chain of mountains which stretches from New Spain to Terra Magellanica, and he therefore concludes that they are the natural inhabitants of the highest regions of the globe, and require a purer and more rarefied air than that of our highest mountains in Europe. A recent writer, in an anonymous history of Peru lately published, observes, that the animals named llamas, pacos, vicunas, and huanacos, are natives of the lofty mountains of that country; and states as a singular particular, that although those mountains extend, under the denomination of Cordilleras, to ten degrees of north latitude, with pretty nearly the same proportion of elevation and cold, these animals do not pass from the line towards the north, and are consequently not to be found in the provinces of Quito, Santa Fé, and others, where the climate of the mountains at least is analogous to that of high Peru, in which latter territory the animals in question live naturally, and multiply their species. The sole reason adduced, to account for this extraordinary circumstance, is, that throughout the whole extent of the northern mountains of the Cordilleras, a kind of pasture which the Peruvians name *ycho*, or *yebu*, and which is denominated by the authors of the Flora of Peru *xarava*, is not to be found. This plant belongs to the gramineous tribe, and appears to be the natural food of these animals. It is extremely abundant in the mountains of Peru; but in those of Quito, Santa Fé, &c. observers have not hitherto succeeded in ascertaining its presence.— This plant has been called by some *ichu*, and *pajon*: it is described flourishing luxuriantly on the loftiest pinnacles of those mountains amidst the snow and ice with which they are perpetually overmantled.

The lamas couple with difficulty from a natural defect in the structure of the several organs of both male and female. It is oftentimes the labour of some hours, or even of a whole day, all which time is spent in growling, quarrelling, and spitting at each other. The Indians assist them on such occasions. They go with young five or six months, and seldom produce more than one at a birth. The female parent has two teats, and the young one follows her as soon almost as it is brought forth.

This animal is known by various names among old writers: it is called *ovis peruanana*, Charlet; *ovis peruana*, and *pelon ichiatl oquitli*, Hernand. hist. Mexico; *hirschcamel*, Gessn.; *camelus peruvianus*, *glama dictus*, Ray; *camelus pilis brevissimis*, Brissl.; *llama*, Ulloa voy.; and *lama*, Buffon.

CAMELUS *Huanacus*, the *huanaco*, or *guanaco* of Molina's Natural History of Chili, is distinguished specifically, according to this author, by having the body hairy, back gibbous, and the tail erect.

This animal, which Buffon considered to be the same as the former species in a state of wildness, is separated from it by late authors with much propriety, on the authority of Molina. The Peruvians themselves, as already intimated, make the same distinction between these two animals, so that we cannot hesitate to believe them different. It should however be stated at the same time, that there are European naturalists of credit who coincide in sentiments with Buffon to this day, that the huanaco is the original race from which the lama has proceeded.

Molina offers some cogent reasons in support of his opinion to the contrary. The lama, as he remarks, has the back nearly straight or level; the four limbs of an equal length, and an excrescence on the breast which is almost con-

stantly humid with a yellowish oily secretion. The huanaco exhibits neither of these peculiarities, the back instead of being level is remarkable for its gibbosity; the posterior legs are longer than the anterior ones, inasmuch, that in ascending or descending precipices in the chace, it can bound and leap with astonishing velocity; and there is no trace of the pectoral bunch, so conspicuous in the lama; it is besides very far superior in size, and differs in other less striking particulars.

The huanacos are stronger, swifter, and of a more lively disposition than the lamas: they run like a stag, and climb over the most craggy precipices with the agility of the goat; and their wool or hair is shorter. Their size is equal to that of the horse; the length from the muzzle to the origin of the tail being about seven feet, and the height from four to five feet. The back is much arched; the head round, and nose somewhat pointed; the ears straight, and the tail short and ascending, or turned upwards as in the common stag.

Although these animals are entirely in a state of freedom, they associate in herds sometimes to the number of two or three hundred. When a man approaches they regard him at first with astonishment, without expressing any fear, but shortly, as if by common consent, they blow through their nostrils, neigh like horses, and then, by taking a general flight, seek a refuge on the tops of the mountains. They prefer the north to the south side of the hills. They often remain above the snowy tracts of the mountains; and when travelling on the ice covered with hoar frost, they seem to be in the best condition, appearing the more vigorous in proportion to the coldness of their situation. The natives of Chili hunt the huanaco for the sake of its fleece: the dogs have much trouble to follow them, and if they can once gain the rocks, both the hunters and their dogs are oftentimes compelled to give up the chace. They are very numerous all along the chain of the Cordilleras, which are full three thousand fathoms above the level of the sea at Peru, and preserve that elevation from Chili to the straits of Magellan. At the beginning of winter they quit the higher parts of the mountains which they inhabit during the summer, and descend into the vallies or plains below in troops commonly of one or two hundred together. The adults run with prodigious velocity, inasmuch that they can be scarcely overtaken with the swiftest horse. The natives are dexterous in pursuing these animals, and sometimes take them alive. The flesh of the young ones, according to Molina, is as good as veal; that of the full-grown animals is hard and dry, but is better salted than fresh. The hair is employed in making caps or hats, and in the fabrication of some sorts of Peruvian cloth.

CAMELUS *Arcuanus*, the *chilibuque*, or as sometimes called the Peruvian camel, *moutons de Perou*, and *aries moromorus*, is another animal of this family: the body is woolly and smooth; snout curved upwards, and ears pendulous. It is thus specifically described by Molina, upon whose authority it is inserted by Gmelin, in his edition of the Linnean Systema Naturæ, as a species distinct from the rest.

This species inhabits Peru and Chili, and is described as measuring about six feet in length, and nearly four in height. It is covered with woolly hair, and in its general appearance is not unlike a ram. The ears are flaccid or pendulous, the neck and legs long; tail like that of a sheep, but shorter in proportion; the wool is very soft, and the colour of the animal is said to vary in different individuals, being either brown, black, ash-coloured, or white. This animal was employed by the ancient inhabitants of Chili as a beast of burthen, as well as in ploughing; its wool was also used by them

CAMELUS.

them in the manufacture of a fine silky cloth, or stuff. Its fleece is employed for a similar purpose at this time.

CAMELUS Vicugna, has the body smooth and woolly; nose flat, blunt, and tail erect. Molin. Hist. Nat. Chili. *Vicuna*, *Vicunna*, and *Vicunna*, *Vicognes*, and *Vigogne* of different authors.

The vicuna bears a general resemblance to the glama, but is of a lighter and more delicate appearance, and of a smaller size; the head smaller, and shorter in proportion; the eyes remarkably large and full; the ears somewhat sharper; and the limbs more slender. The colour on the upper parts is a reddish brown, and the remainder of an isabella colour, except the breast, belly, insides of the thighs, and under part of the tail, which are white. The hair of this animal is of a very soft, wavy, and woolly nature, that on the breast is nearly three inches long; on the other parts not more than one inch; the end of the tail is furnished like the breast with long woolly hair. The individual described by Buffon was of a somewhat fierce disposition, and frequently attempted to bite those who examined it. It was never observed to drink, and seemed to have the same general habits and manners as the glama.

This animal inhabits the loftiest summits of the Andes, and is allowed to afford a much superior wool to that of either of the former species. It was once domesticated in Peru as the lama is at present; but the breed is now lost, and they are only to be found at this period in a state of nature among the mountains. The natives often go in pursuit of the vicunas which they chase with dogs, or take by stratagem, and kill them chiefly for the sake of their wool. It is clearly proved from past experience, that these useful animals might be domesticated with ease, and that their domestication would be attended with considerable advantage to individuals, and benefit to the state, were proper regulations adopted for this purpose. But unless some salutary measures are taken, there is reason to believe the whole race of these animals will be exterminated in a few years. When the Indians go out in chase of them, their only object is to destroy as many as possible. It was no uncommon circumstance till of late years for a troop of these hunters to return home from the pursuit with the skins of five hundred, or perhaps a thousand of these animals. The hair is sold to the merchant upon the skin, that he may be assured it is the genuine product of the vicuna, and not of the paco, which is rather of a coarser quality. Very fine cloth is woven with the vicuna wool, both in Peru, and in Spain, to which country it is exported from Peru. Buffon supposes the vicuna would be a valuable acquisition to Europe, could the breed be introduced, and propagated with success: he is led to imagine that they would thrive well on the Pyrennees and the Alps, nor is this improbable. It seems indeed to be in the contemplation of the present government of France, to bring the experiment to issue by the introduction of these animals from Peru into those mountainous regions, as Buffon suggested; so fully are the French agriculturists of this time satisfied of its practicability, and of the success that would attend it.

In the year 1774, a cloth-worker in Paris of the name of Breton, fabricated a piece of cloth of the vicuna wool, in its natural colour, which answered extremely well, and was submitted to the inspector general of commerce as an essay deserving the attention of government, and likely to become an object of public utility. He also dyed pieces of this cloth of various colours, as dark and light blue, crimson, violet or purple, and scarlet, and all with an equal degree of success. Other experiments were also tried by the French manufacturers shortly after that time. Shawls in

particular, formed of the vicuna wool, under the direction of M. Decretot of the Louviers, are reputed to have been of great beauty; and in the delicacy of texture, and softness, to emulate the rich shawls of Cashmere. These particulars will be sufficient to shew of what real utility the cultivation of the vicuna with due attention might become hereafter in Europe.

CAMELUS Paco, the *paco*, *alpaco*, and *alpaque* of various authors, an animal nearly resembling the vicuna, and specifically distinguished by having no bunches; body woolly; and snout oblong.

This species is said to be entirely confined to Peru, where the natives keep vast flocks of them for the sake of their wool, of which they prepare cloth of a silky lustre and softness. Like the Vicuna, it is found in mountainous districts in large herds, but is never observed to associate with those animals. Some say it is of a more robust make than the vicuna, and is covered with very long wool, which, in the wild animal, is of a dull purple colour, beneath white, and when tamed, varying with black, white, and tawny.

The pacos are considered as a subordinate kind of animal to the lamas, much in the same proportion as we value the ass with regard to the horse: they are smaller, and not so serviceable, but their fleeces are more useful. Their wool is fine and long, only of a coarser quality than that of the vicuna, and, with the latter, forms a considerable article of merchandise in South America.

In a domestic state, the pacos are called by the Peruvians alpaques. The natural colour of the wool or fleece of the wild pacos, which resembles that of a dusky rose, or rather more inclining to purplish brown, is so fixed, that it undergoes no alteration under the hands of the manufacturer. They not only make good gloves and stockings of this wool, but also weave it into quilts and carpets, which sell at a high price, and form a valuable part of the Spanish commerce. The pacos possess many things in common with the lamas: they belong to the same country, and are nearly of the same disposition and manners: they bear much resemblance in figure to the lamas, but are smaller: their legs shorter, and their muzzles thicker and closer.

The wild pacos inhabit and pasture on the highest parts of the mountains. Snow and ice seem rather to refresh than to be inconvenient to them: they keep together in flocks, and run swiftly. They are timid animals, for as soon as they perceive any person, they take flight, driving their young before them. The ancient monarchs of Peru rigorously prohibited the hunting of them, because they multiply so slowly; but since the arrival of the Spaniards in those parts, their number is greatly decreased. The flesh of these animals is not so good as that of the huanaco: they are chiefly sought after for their fleece, and the bezoars they produce. The method of taking them proves their extreme timidity. The hunters drive a flock of them into a narrow passage, across which they have stretched cords about four feet from the ground, with a number of pieces of linen or woollen cloth hanging to them. The animals are so intimidated at these rags, agitated by the wind, that they stop, and crowding together in a heap, are killed with the greatest ease. But if there happen to be any of the huanacos among the flock, as they are less timid than the pacos, they leap over the cords, and the example being followed immediately by the whole drove, they escape for that time from their pursuers.

As to the domestic pacos, they are employed to carry burthens, like the lamas, but they can only bear a much less weight in proportion to their size than the lama, seldom carrying more than from fifty to seventy pounds. They are, besides,

besides, of a more stubborn nature, and when once they lie down with their load, they will suffer any torment sooner than rise. The Indians never make use of the milk of these animals, because they have scarcely enough to supply their own young. The great profit derived from their wool induced the Spaniards to endeavour to naturalize them in Europe: they transported numbers of them to Spain with this view, but the climate not agreeing with their nature, they all died. Those who brought them into Spain did not consider, that they cannot exist even in Peru, but in the coldest regions, and on the summits of the loftiest mountains: that they are never found in the vallies, and if transported to warm countries, cannot long survive the change from their natural climate. Had they been sent to the Pyrennées, or other Alpine regions, it is possible they might have ascended the mountains till they found of themselves a climate suited to their nature. At least, the experiment must be ever fruitless, unless they can be accommodated with a climate as nearly agreeing with their own as the coldest parts of Europe will allow.

Such animals as subsist on vegetables, and live on the high mountains of Asia and Africa, produce that kind of animal concretion called bezoar, the virtues of which were formerly so highly extolled. The pacos produce that particular sort known by the name of occidental bezoar, in great abundance, as do also the huanacos, and the rest of the lama tribe, or Peruvian camels; but it is only from those animals, when in a state of nature, that bezoar of any value can be obtained. See BEZOAR.

The paco is considered by some naturalists as an animal forming an intermediate species between the lama and vicuña. Molina, in his "Voyage to Chili," has given a good description of the paco, the result of which proves, that the paco is more robust than the vicuña, has a much longer muzzle, and fleece of longer wool, but not so fine. The Peruvians keep vast flocks of them for the sake of their wool, with which they fabricate stuffs that have the brilliancy of silk. This animal, which appears, however, to be so abundant in Peru, we are told, is not found in Chili, either wild or in a state of domestication.

CAMELUS, in *Zoology*, a species of TRICHODA, found in vegetable infusions. This is thickish, hairy before, and emarginate on each side in the middle. Müll. Zool. Dan.

CAMELUS, camelus indicus, camelus indicus versicolor, and camelopard of different writers are synonyms of the Linnæan cervus camelo-pardalis, and Gmelinian CAMELO-PARDALIS *Giraffa*, which see.

CAMEN, or KAMEN, in *Geography*, a town of Germany, in the circle of Westphalia, and county of Marck; 20 miles S. of Munster.

CAMENZ, a town of Lusatia; 21 miles N.E. of Dresden, and 13 W.N.W. of Budissen.

CAMERA, in *Antiquity*, derived from the old German *Cam*, *Cammer*, crooked, whence our English *kembo*, arms in kembo. At first it signified any winding or crooked plat of ground, as "unam cameram terræ," i. e. a nook of land. Afterwards the word was applied to any vaulted or arched building; and it was used in the Latin law-proceedings for the judge's chamber, &c. "camera stellata," the star-chamber, &c.

CAMERA, or CAMERIA, called also *Camers*, in *Geography*, a city of great note in Umbria. See CAMERINA.

CAMEKA, *Ital.* a chamber. This word, when joined to another, becomes a musical term: as *musica di camera*, compositions for a small band; *voce di camera*, a feeble voice.

Musica di camera is one of the three species of composition

under which all music may be comprised: as *musica di chiesa*, church music; *musica teatrale*, theatrical music, including music for public concerts; and *musica di camera*, chamber music.

CAMERA *Æolia*, a contrivance for blowing the fire, for the fusion of ores, without bellows; by means of water falling through a funnel into a close vessel, which sends from it so much air or vapour as continually blows the fire: if there be the space of another vessel for it to expatiate in by the way, it there lets fall its humidity, which otherwise might hinder the work. The contrivance was named *camera Æolia* by Kircher. Hook, Phil. Coll. N° 3. p. 80. See BELLOWS.

CAMERA *lucida*, a contrivance of Dr. Hook for making the image of any thing appear on a wall in a light room, either by day or night. Opposite to the place or wall where the appearance is to be, make a hole of at least a foot in diameter, or if there be a high window with a casement of this dimension in it, this will do much better without such hole, or casement opened. At a convenient distance, to prevent its being perceived by the company in the room, place the object or picture intended to be represented, but in an inverted situation. If the picture be transparent, reflect the sun's rays by means of a looking-glass, so as that they may pass through it towards the place of representation; and to prevent any rays from passing aside it, let the picture be encompassed with some board or cloth. If the object be a statue, or a living creature, it must be much enlightened by casting the sun's rays on it, either by reflection, refraction, or both. Between this object and the place of representation put a broad convex glass, ground to such a convexity, as that it may represent the object distinctly in such place. The nearer this is situate to the object, the more will the image be magnified on the wall, and the further the less; such diversity depending on the difference of the spheres of the glasses. If the object cannot be conveniently inverted, there must be two large glasses of proper spheres, situate at suitable distances, easily found by trial, to make the representations erect. This whole apparatus of object, glasses, &c. with the persons employed in the management of them, are to be placed without the window or hole, so that they may not be perceived by the spectators in the room, and the operation itself will be easily performed. Phil. Trans. N° 38, p. 741, seq.

CAMERA *Obscura*, or DARK CHAMBER, in *Optics*, a machine or apparatus so constructed, that principally by means of a convex glass, or a convex glass and plane mirror, the images of external objects are represented on a rough ground plane glass, white paper, white wall, or other surface, in the most vivid and distinct manner, with all their natural motions, colours, shades, &c. The first invention of the camera obscura has been ascribed to Baptista Porta.—See his *Magia Naturalis*, lib. xvii. cap. 6. first published at Frankfort about the year 1589 or 1591. The first four books of this work were published at Antwerp in 1560. But Dr. Freind, in his "History of Physic," (vol. ii. p. 236.) observes, that friar Bacon, who flourished in the beginning of the 13th century, describes the camera obscura, and all sorts of glasses, which magnify or diminish any object, bring it nearer to the eye, or remove it farther off. See also Bacon's "Opus Majus" by Dr. Jebb, p. 236; and his Epistle "ad Parisiensem," and his "Perspective" cited by Dr. Plott in his "History of Oxfordshire," p. 215; from which we may conclude, that he had a very accurate and extensive acquaintance with the properties of various kinds of glasses.

CAMERA *Obscura*, the use of the, is manifold: it assists very much in explaining the nature and rationale of vision, and hence

hence by some it has been compared to the artificial eye. It exhibits the most striking and entertaining representations of objects of all descriptions, whether near or distant, in their true perspective, the colouring just and natural, their light and shadows correct, and all their motions and relative positions according to the original. By means of this instrument, a person however unacquainted with drawing, may delineate objects with great facility and correctness; and to the skilful artist it will be found indispensably useful in comparing his sketches with the perfect representations given in the camera, and by observing his defective imitations, he may correct, as much as possible, his designs. To the delineations of that beautiful representation called the *Panorama*, this instrument has proved of essential use.

CAMERA Obscura, the theory of the, is contained in the following proposition.

If an external object, as *A*, *Plate III. Optics, fig. 1*, radiates its light through a small aperture *C*, in a shutter of a perfectly darkened room upon a white paper or painted screen opposite to it, an image of the object will be depicted on the screen in an inverted position. For the aperture *C* being supposed very small, the rays issuing from the point *B* will fall on *b*: those from the points *A* and *D* will fall on *a* and *d*; wherefore, since the rays issuing from the several points are not blended, they will, by reflection, exhibit its appearance on the screen. But since these rays, *AC* and *BC*, intersect each other in the aperture, and the rays from the lowest points fall on the highest, the situation of the object will necessarily be inverted. Hence, since the angles at *D* and *d*, and the vertical ones are equal at *C*, *B* and *b*, and *A* and *a*, will be also equal; consequently, if the screen where the object is delineated be parallel to it, $ab : AB :: dC : DC$.

That is, the height of the image will be to the height of the object, as the distance of the image from the aperture is to the distance of the object from the same. This proves, therefore, that the inversion of the object is not owing to any lens that may be used in a camera obscura. In this manner, the figures of the image are very faint and confused, for want of a due degree of light, and its proper refractions.

CAMERA Obscura, construction of a, whereon the images of external objects are distinctly represented in their genuine colours, light and shade, &c. and either in an erect or inverted position.

1. Darken, in the most perfect manner possible, a room or chamber; in the shutter of one of the windows that faces the object to be represented, cut a small circular aperture, see *fig. 1. C*.

2. In this aperture fix either a double or plain convex lens; if the latter, with the convex side next the object. Its focus may be of any length between 3 and 6 feet.

3. At a proper distance, to be determined by experiment, or about the focal distance of the lens, place perpendicularly a large surface of white paper or cloth, and on this the images of the external objects directly before the lens will be beautifully delineated, but in an inverted position. The paper or cloth should be moveable, so that the exact distance of the focus of the lens may be obtained, or the images will not be shewn with their utmost distinctness. Those objects also should be selected that are in the strongest light, or illuminated by the sun's rays. In northern latitudes at noon-day, a window opposite the north is best; in the morning, facing the west, and in the evening facing the east. In southern latitudes a window facing the south is best at noon. The shorter the focus the smaller and brighter the images will appear; and the longer, the larger the objects; but if

the focus be very long, from 20 to 30 feet, the same light being more dilated or spread over a large surface, the images will appear somewhat obscure, and the colouring fainter. The images will be still brighter if the spectator first stay a quarter of an hour in the dark.

This is the most perfect method of obtaining a representation of objects, from having but one refracting medium, but in some cases the inverted position of the images may be some objection; to obviate which, the following methods may be used to make the picture erect. Hold a true ground plain mirror slantwise against your breast, under an acute angle, and looking therein, you will see all the images restored to their natural and erect position, and with an addition of lustre that they will receive from the reflection of the mirror. Or, which is a better way, and does not require a mirror near so large, place a mirror above and rather near the lens, so as to reflect the rays down upon a white surface, a screen directly under, or parallel to the mirror. Or, a large concave mirror may be placed before the picture, at such a distance that the image of the picture may appear before the mirror, which will then be erect, and appear pendant in the air. Another method, which is more direct, is by placing another convex lens in a partition behind the paper or screen, with the image at twice the focal distance of the said lens, the axes of the two lenses coinciding, in which case another picture of the images will be formed but erect, as large as the first, but not so bright, and with a contracted field or extent of the picture. Or, two lenses of short foci in draw-out tubes, may be applied to the hole in the shutter instead of one, which will also produce an erect position of the images, but the light will be less, the extent very limited, and serve only for the representation of busts, small figures, &c. as hereafter to be described. This method is but of little use and seldom practised.

The following description of cameras obscuras has been communicated to us by Mr. William Jones, optician, Holborn, as being the most commodious and perfect, and what have been preferred, and are in general use, by the most skilful artists:—

Fig. 2. represents the sciopic ball, which is made of mahogany, and consists of three parts, a frame, a ball, and a lens. The frame consists of two pieces in a circular screw rim, fitted one to the other, and both so excavated as to admit, and keep steady a spherical ball perforated, which is voluble in its frame more or less easily, as the parts of the frame are less or more screwed together. At each end the hole in this ball is a screw cell for containing a lens; these lenses are of different focal lengths, and only one is to be used at a time, when the images are to be formed. The frame of this sciopic ball is to be screwed fast to the window shutter or window board of a well-darkened room, before a hole previously made therein. There are two brass nuts and screws, *a, b*, fitted to the frame for that purpose; the nuts are screwed to the shutter or board, so that by means of the screws the sciopic ball may be the more readily attached to, or detached from, the shutter. This apparatus is very convenient, when experiments by a variety of lenses may be desired. *A, fig. 2*, represents the position of a mirror when applied for reflecting downwards the images in order to obtain the erect positions; if the frame be made to turn on an hinge, it will be the more useful to direct the image to an oblique screen, or table, as may be required. *Fig. 1.* represents a darkened room with a lens attached to the side or shutter, or where the sciopic ball is to be placed. *E* represents the moveable white paper screen that receives the images of the objects formed by the lenses, and is moveable to the distance of the focal length of the glass. *A B* shews the manner in which the bust, ita-

true, or picture, may be fixed on a support on the outside of the window, so that an image may be formed upon the paper within, from which the artist is to copy or delineate. For such proximate objects the focus of the lens must be short, from 9 to 12 inches, or the screen will be required to be at too remote a distance from the lens. When the distance of the object and the image are the same from the lens, the image will be of the same size as the object. When the object approaches nearer, the image will recede and enlarge, and *vice versa*.

To exhibit Solar Phenomena by means of the Scioptic Ball and Socket.

The scioptic ball affords a very convenient method of forming an image of the sun in the darkened room. If a lens 10 or 12 feet focus be placed on it, and a white paper screen placed at its focus, in a perpendicular position to the rays, a distinct image of the sun will be formed, about one inch diameter, on which will be conspicuously exhibited all the spots or solar maculæ. At the time of a solar eclipse, the whole progress of the moon, from the time of the first contact of the limbs to the last, may, in this way, be observed very distinctly. But the best method is by connecting a draw-out telescope, with the ball of the socket, *fig. 2.* by screwing the end with the object glass to it, and taking out all the eye glasses at the other end, except the one next to the eye, then moving inwards the first tube till the image of the sun appear distinct; and you will have a bright image from 12 to 20 inches diameter, according to the distance of the screen, which will, to any number of spectators, exhibit the solar phenomena intended to be viewed.

Construction of a Chamber Camera Obscura.

The foregoing is the readiest and most simple method of converting a room into a camera obscura, but it is attended with these objections, that it only serves for objects directly facing the lens, and occasions always the trouble of darkening the room, fixing and adjusting the apparatus, &c. *Fig. 3.* represents a roof shaded like a dome or cupola, placed over a building, prospect-room, or temporary room erected for the purpose of a camera obscura, and in this way affords the most ready and advantageous plan for all surrounding objects. The whole dome A B may be made to turn round on friction wheels, in a groove made in the roof for that purpose, and to carry round with it the glasses in the box C above, or which, in some cases, is a more manageable way, the box with the glasses is made moveable in a groove round upon the dome, and is turned by means of a long rod by a person within. The manner of fabricating such a dome and box will be evident to any good joiner by a mere inspection of the figure. The mahogany box C is of a cubical form about 6 or 7 inches in the length of a side; a true ground mirror in a frame is placed diagonally in the box, and is moveable somewhat on an axis at its lower edge upwards and downwards, to reflect the rays from objects at various distances; underneath this mirror, in a round cell, at the bottom of the box, is fixed a double convex lens, about 6 or 8 feet focus, and 4 or 4½ inches in diameter: this lens will form upon a white table D, placed on the floor below, the images of the objects reflected by the mirror above, at the focal distance of the lens. The diameter of this table should be 2½ or 3 feet, excavated on its surface to a small degree of concavity, or from a radius about the focus of the lens, in order, that the inequality of the distance of its surface from the centre of the lens, presenting the images indistinct at the circumference, when they are clear in the middle, may be obviated. The surface must be painted perfectly white, or, which is better, covered with a thin coating of plaster or stucco. The pillar of the table should be made with a screw working in a female one cut

in the pedestal, so that by turning round the table and screw its surface may either be elevated or depressed, as may be necessary, to admit of the clearest and best defined picture of the images possible. To persons having dwellings upon elevated situations commanding extensive prospects over countries, rivers, the sea, &c. a machine of this kind constructed over it will afford more delight and entertainment, as well as use to an artist, than any person would imagine, who had not previously been a witness to such an effect. To those who may not wish to be at the expence of a dome, Mr. Jones recommends the box fitted to a wooden pyramidal trunk, (see *fig. 4.*) which trunk can be fixed on the ridge of the roof of a house or chamber, by a common carpenter, and a flat sliding cover to slide on at A, to cover the trunk when the box of glasses B is taken away after use. The camera boxes, with the glasses complete, and ready for fixing, are made by Messrs. Jones, of Holborn, and other Opticians. Metallic mirrors have been used instead of glass ones for cameras; they reflect more light, and consequently shew the images brighter, but their liability to tarnish and corrode is an insurmountable objection to their general use.

CAMERAS Obscuras, construction of portable. The glasses of a camera obscura are frequently fitted to a portable machine shutting up in the form of a chest, or book, so as to be portable, and easily transported from place to place, and carried about by the artist. The apparatus within is contrived to fold outwards, and form a machine as represented at *fig. 5.* and it is contrived upon the most convenient plan of any hitherto constructed. It is represented as placed together for use. The lid front A, and the slides, one shewn at B, by means of hinges turn up to the height of about two feet from the case C D E, and are fastened together by small brass hooks. The head and sliding box, with glasses F, also fasten on by hooks within. The lens of about 2½ inches focus is placed under the true parallel glass mirror, and forms the images on a white sheet of paper, placed in the bottom of the chest. To view the images the face is applied close to a piece under A for that purpose, and to trace the outline, or copy them, the arm at the same time is applied in the cloth sleeve under H. The box F slides on a square tube, and by means of a brass rack and pinion G the lens is adjusted, while the images are viewing, to its proper focal distance from the white paper below. The images formed on the paper have a correct and natural resemblance to the original objects; no inversion takes place, and even names and letters on objects are in their direct order. This camera is converted into an instrument for magnifying perspective prints and drawings, and forms the best possible apparatus for that purpose. The head F G and tube are to be entirely removed, as well as the front A, and cloth C D, and another head with a diagonally-placed mirror and large convex lens, *fig. 6.* substituted, and also hooked on. The prints are to be placed at the bottom of the chest, and as the camera case is open, the print will be illumined either by day light or candle light, as required. The print is viewed by reflection in an horizontal direction, by the eyes being placed before the large convex lens. When the sides and front are unhooked and folded down into the chest, they all lie close, and admit the head to lie under them; and the dimensions of the chest, when thus shut up, do not exceed 2 feet in length, 20 inches in breadth, and 5 inches in depth.

The most portable kind of Camera obscura is that represented at *fig. 7.* and is that most frequently used among artists, on account of its convenient dimensions. The images are reflected on a rough ground plane glass, and are more vivid than those formed on paper, by the Camera above described. It is made of mahogany, and of various dimensions,

some so small as to be carried in the pocket. The lens at the front A is fixed in the cell, in the front of a square draw-out tube, and is of a focus equal to the length of the box when the drawer is half drawn out; and a plain mirror is placed diagonally at the angle of 45° , at the end of the box, as shewn by the dotted line *ab*, which reflects the rays transmitted by the lens up to the upper side of the plane rough-ground glass, the rough side placed above, under the folding darkening cover, and there forming the images of the objects before the lens at A: the use of the draw is to adjust the proper distance of the lens from the mirror, according to the variable distances of proximate objects. The images on the rough glass exhibit a beautiful perspective picture, also the profile of a person seated in a room in a strong light before the camera, and more particularly if the sun illumine the object; and may be readily traced on the rough surface of the glass by a black lead pencil, or by what is preferable, red French chalk, and then white paper being gently placed on the glass, the lines will be taken correctly off. If very thin white paper is merely placed upon the glass, the images may be discerned, though faintly, sufficient to afford the means of tracing correctly. The nearer the object or features are to the camera the larger will be the image, and an additional lens of a shorter focus is sometimes fitted to be substituted for the other, when the images of very near objects are wanted. Some artists who take profiles take out the rough glass from its cell, invert the camera, and by a stand support it about 10 or 12 inches above the white paper on the table. The image will then invertedly be formed on the paper, and they trace it with a pencil in a correct manner, and with less trouble than by the other method. Messrs. Jones, of Holborn, make an improved camera of this kind, by joining the side of the camera and drawer in the middle with canvas cloth, as shewn at the lines B G: the back C turns inward with the mirror, close up to the rough glass, and the front E F above, over the top, so that the whole camera may fold down into a flat form, and go into a very portable flat leather strap case, making it the most portable possible for persons travelling. Inclusive of the rough glass has sometimes been placed a double convex lens to relieve the images, and from more light being thus refracted, the images are shewn with great beauty and extraordinary brightness, even surpassing the original. They are also more vivid when the rough glass is placed over this lens, though the contours, or outlines, are not so sharp or distinct as when the rough glass is used only by itself. This improvement was assumed some years ago, by a person of the name of Storer, as a discovery, and called a *delineator*, but without the least pretensions, it being previously well known by the most eminent opticians, and it was, in the year 1758, noticed by Mr. Hooper, in his *Rational Recreations*, vol. ii. p. 29. Guyot's *Recreations Physiques*, tom. ii. recr. 35. art. 2. Mr. Harris, in his "Optics," b. ii. § 4. has described a variety of contrivances for converting the portable camera into a shew-box for viewing prints.

CAMERARIA, in *Botany* (named by Plumier in honour of Joachim Camerarius jun. a physician and botanist of Nuremberg, who flourished in the latter part of the 16th century, and published an improved edition of Matthioli in Latin and German, and some other botanical works). Linn. gen. 300. Schreb. 423. Willd. 484. Juss. 145. Vent. 2. 423. Class and order, *pentandria monogynia*. Nat. ord. *Contorta*. Linn. *Apocinee*.

Gen. Ch. *Cal.* perianth one-leaved, small, with five acute teeth. *Cor.* funnel-shaped; tube long, swelling out at the base and at the top; border flat, with five lanceolate oblique segments. *Stam.* filaments five, small, attached to the middle of the tube; anthers converging. *Pist.* germs two, with

lateral appendages; style scarcely any; stigma obscure. *Peric.* follicles two, horizontally reflexed, oblong, compressed, obtuse at both ends, with two opposite lobes at the base of each. *Seeds* numerous, egg-shaped, compressed, with a membranous ring at their base by which they are attached to the receptacle lengthwise in a single row, an imbricated manner, and inverted direction.

Eff. Ch. *Corolla* contorted. *Follicles* two, horizontal. *Seeds* inferted by a membrane.

Species, 1. *C. latifolia*, bastard mangeneel, Linn. Sp. Jacq. Amer. 37. tab. 182. Plum. ic. 72. fig. 1. Brown. Jam. 182. Lam. Illust. Pl. 173. fig. 2. "Leaves egg-shaped, acute at both ends, transversely striated." A tall elegant tree, about 30 feet high, abounding with an acrid milky juice. *Trunk* straight and thick. *Branches* generally dichotomous. *Leaves* opposite, petioled, entire, rather stiff, shining. *Flowers* white, peduncled, terminating the branches. A native of the West Indies and South America. 2. *C. zeylanica*, Willd. Retz. Ob. 4. p. 24. (*Apocin-Nerium*, Linn. Zeyl. 404. "Leaves oblong, egg-shaped, acuminate, transversely striated in terminal and axillary corymbs. Its leaves are longer and flowers smaller than those of the preceding species. A native of Ceylon. 3. *C. lutea*, Willd. Lam. Encyc. (*C. Tamaquarina* and *Guianensis*, Aubl. 1. p. 260.) "Leaves oblong egg-shaped, reticularly veined; umbel peduncled, few-flowered." A shrub three or four feet high, four or five inches in diameter. *Stem* with a greenish smooth bark; branches long, straight, subdivided. *Leaves* opposite, entire, smooth, on short petioles. *Flowers* yellow, large, pedunculated, of a pleasant smell, growing in umbels from the forks of the branches. A native of Guiana. Its branches, when cut, yield a milky juice. The *Tamaquarina* and *Guianensis* of Aublet are supposed by La Marck and Willdenow to be only varieties of the same species. The flowers and leaves of the latter are smaller. 4. *C. angustifolia*, Linn. Sp. Plum. Ic. 72. fig. 2. Lam. Illust. Pl. 173. fig. 3. "Leaves linear." A shrub about eight feet high. *Stem* irregularly branching. *Leaves* opposite, entire. *Flowers* loose, at the ends of the branches. It abounds with an acrid milky juice. A native of the West Indies and South America.

CAMERARIA (Dillen.). See *MONTIA fontana*.

CAMERARIUS, or *Chamberlain*, in *Antiquity*, an officer who had the care of the dormitory in ancient religious houses.

CAMERARIUS, JOACHIM, in *Biography*, an elegant German scholar and biblical writer, was born at Bamberg in Franconia in 1500; and was no less distinguished for his eloquence than for his knowledge of the languages, history, mathematics, and politics. He was honoured with the friendship of Charles V., Maximilian II., and other princes; and by the diligence and zeal with which he delivered his lectures at Nuremberg, Tubingen, and Leipzig, he very much contributed to promote the cause of universal science, and more especially the study of elegant literature. He translated from Greek into Latin, parts of Herodotus, Demosthenes, Xenophon, Euclid, Homer, Theocritus, Sophocles, Lucian, Galen, Chrysostom, Theodoret, Aristides, Nicophorus, Gregory of Nyssa, &c. He also wrote in Latin the lives of Melancthon and Hessius: and composed "Commentaries on the New Testament," in which, says Mosheim (*Ecc. Hist.* vol. iv.), "he expounds the scriptures merely in a grammatical and critical manner; and laying aside all debated points of doctrine and religious controversy, unfolds the sense of each term, and the spirit of each phrase, by the rules of criticism, and the genius of the ancient language, in which he was a very uncommon proficient." The last edi-

tion of this commentary was printed at Cambridge in 1642. It is bound with Beza's Greek Testament, printed at Cambridge in the same year. Camerarius frequently quotes a MS. which he describes as ancient, and which is noted 88 in the first part of Wettstein's New Testament. He likewise published a catalogue of the bishops of the principal sees; Greek epistles; accounts of his journeys in Latin verse; epigrams of the ancient Greek poets; a commentary on Plautus; and several other learned works. Turnebus, H. Stephens, Lipsius, Beza, and many others distinguished for their literature, concur in bearing ample testimony to his talents and learning. He died in 1574; and left several sons, who were eminent for their literary attainments. Gen. Dict.

CAMERARIUS, JOACHIM, a physician of learning and eminence, was born at Nuremberg in 1534, where he received the rudiments of his education. As his mind was early turned to the study of botany and medicine, with the view of improving himself, he visited the principal seminaries in Germany, and thence went to Padua, and afterwards to Bologna, where he took the degree of doctor in 1562. Two years after he returned to Nuremberg, and by his superior skill and ability, aided perhaps by the high character his father had borne, who was esteemed one of the restorers of literature, he conciliated to himself the favour of the principal personages in the city. Under their patronage, in 1592, he founded a medical college, of which he was appointed dean or president, and in that situation continued to direct the affairs of the institution for the remainder of his life. Mindful of his favourite object, botany, he formed an extensive garden, stored with the choicest plants, the cultivation of which he superintended with great assiduity. He also assisted the landgrave of Hesse with his advice in forming a botanical garden; and with a view of disseminating the knowledge of plants, he purchased the collections of Gesner and Wolfe, which he methodised, and corrected, and with considerable additions from his own stores, together with the works of Matthioli, he published them in 1586, under the title of "*De Plantis Epitome utilissima Petri Andræ Matthioli novis Iconibus et Descriptionibus plurimis diligenter aucta*," 4to. "*Hortus Medicus et Philosophicus, in quo plurimarum Stirpium breves Descriptiones, novæ Icones non paucæ, continentur*," 4to. 1588. "*Opereula de Re Rustica, quibus, præter alia, Catalogus Rei Botanicae et Rusticae Scriptorum veterum et recentiorum insertus est*," 1577, 4to. Also "*De recta et necessaria Ratione preservandi a Pestis Contagione*," 1583, with other small tracts on the same subject, and three centuries of emblems. On his death, which happened October 11, 1598, he was succeeded by his son Joachim, in his practice and in the honour of being dean of the college. Haller. Bib. Botan. Eloy. Dict. Hist.

CAMERARIUS, ELIAS RODOLPH, son of Rodolph John C. a physician of eminence at Tubingen, was born in 1640. Following the steps of his father, he was made doctor, and soon after professor of medicine in the university of Tubingen, which office he held to the time of his death, which happened on the 7th of June 1695. He was author of numerous dissertations on the subject of medicine, in which are detailed such rare cases as had occurred in his practice. Among them, "*Historia Anatomica Renum et Vesicae*," 1683, 4to. In this he gives an account of a dissection of a person who died of an affection of the kidneys. Of one of the kidneys there only remained the external membrane, which was full of purulent matter, into which the kidney had been resolved.

By his father "Sylloge Memorabilium Medicinæ, et Mi-

rabiliū Naturæ Arcanorum, Centuriæ iv.;" among them are two cases containing accounts of a portion of the tongue being regenerated, after being removed by an operation. Haller. Bib. Med. et Chirurg.

CAMERARIUS, ELIAS RODOLPH, son of the former, professor of medicine at the university of Tubingen, and first physician to the duke of Wirtemberg, was author of numerous dissertations and treatises on different branches of medicine, which appeared in succession from the year 1691 to 1733. He was a learned and ingenious, rather, Haller says, than an experienced practical physician. His disquisitions are also on subjects that are rather calculated to gratify curiosity, than to advance our knowledge in the method of treating and curing diseases: viz. "*An liceat Medico pro Salute Matris Abortum procurare*?" 1697, 4to.; "*Machinæ Humanæ cum Thermometro, Barometro, et Hygrometro Analogia*," 1721, 4to.; "*De Calculis in Vesicula fellea repertis*," 1724, 4to.; "*Magici Morbi Historia attentius pensitata*." Some however are practical. "*De Podagra*." "*De Hydropse Uteri*," &c. In his larger work, "*Dissertationes Taurinenses Epistolice xx. ad illustres Germaniæ et Italiæ Medicos*," Tubing. 1718, 8vo. he gives an account of some rare and unusual complaints, which had fallen under his notice; among others, of catalepsy, of mania occasioned by disappointment in love cured by exciting terror, of loss of memory occasioned by a blow on the hinder part of the head, &c. Haller. Bib. Med. et Chirurg.

CAMERIA, in *Ancient Geography*, a town of Italy, in the territory of the Sabines, according to Livy; called *Camerium* by Pliny, and *Camaria* by Steph. Byz. and Dionys. Halic. The two last say, that it was a colony of citizens from the city of Alba.

CAMERINA, in *Geography*, a town of Italy, in the Ecclesiastical state, and marquise of Ancona, near the Apennine mountains, the see of a bishop immediately subject to the pope, and containing 19 convents; 71 miles N.E. from Rome, and 38 S.W. from Ancona. The ancient city of this name was treacherously surprised in the days of its glory by Dionysius the tyrant, who delivered it up to the Carthaginians; and, destitute from that period of walls or fortifications, it was afterwards demolished, and now lies buried under the sand. Its territory belongs to the prince de Biscaris, who has found a number of curious and valuable antiquities.

CAMERINUM. See CAMARINUM.

CAMERLINGO, or CAMARLINGO, the chamberlain of the pope's court, or the person who has the administration of the apostolical chamber.

The word imports as much as keeper of the chamber, or treasurer; though the camerlingo has divers other jurisdictions which have no relation to the office of treasurer. The name anciently denoted a *cubicularius*, or gentleman of the bed-chamber; but this is now expressed by *cameriere*. The camerlingo is the most conspicuous officer in the court of Rome; because all the revenues of the holy see are managed by the chamber of which he is president.

This office was anciently performed by the archdeacon of Rome, a dignity which was suppressed by pope Gregory VII. as of too great power and interest; insomuch that he could often controul the pontiff himself, and generally by his intrigues raised himself to the papacy. In his stead was placed a cardinal, under the title of camerlingo, who is assisted in his function by twelve prelates called clerks of the chamber, *clerici de camera*.

The cardinal camerlingo, on the death of a pope, does not enter the conclave with the rest, to assist at the election of a new one, but stays without, keeps possession of the pope's

pope's apartment in the Vatican; and whenever he goes abroad is attended by the Swiss guards, like the pope himself. He even coins money in his own name, and with his own arms; and, in fine, is a kind of vice-pope, governing the ecclesiastical state during the vacancy of the holy see.

The cardinals have also their camerlingo, or treasurer of their college, distinct from that of the pope: the former is elected every year, whereas the latter is for life. The person chosen to this office has the receipt of all the revenues belonging to the college, which he is to distribute at the end of the year in equal portions to the cardinals then at Rome; those who are absent having no share therein after they have been six months from court.

CAMERON, JOHN, in *Biography*, one of the most famous divines amongst the Protestants of France, in the 17th century, was born at Glasgow, in Scotland, about the year 1580, and taught Greek there, till he removed to Bourdeaux in 1600. Here he acquired such celebrity by the fluency with which he spoke Greek, that he was appointed to teach the learned languages at Bergerac. He afterwards became professor of philosophy at Sedan; but returning to Bourdeaux in 1604, he devoted himself to the study of divinity. Upon being appointed tutor to the sons of the chancellor of Navarre, he accompanied them to Paris, Geneva, and Heidelberg. After having discharged the office of a minister at Bourdeaux, which he assumed in 1608, for 10 years, he accepted the professorship of divinity at Saumur. Upon the dispersion of that academy by the public commotions in 1621, he removed to England, and taught divinity at his own house in London. King James, inclined to favour him on account of his supposed attachment to the hierarchy, made him master of the college, and professor of divinity at Glasgow; but after holding this office, which he found to be unpleasant to him, for a year, he returned to Saumur, where he read private lectures. From thence, he removed in 1624 to Montauban; where the disturbances excited by the emissaries of the duke de Rohan, led him to remonstrate against the principles which produced them, with more zeal than prudence. This occasioned his being insulted by a private person in the streets and severely beaten: and this treatment so much affected him, that he soon after died, in 1625, at the early age of 46 years. Bayle represents him as "a man of great parts and judgment, of an excellent memory, very learned, a good philosopher, good-humoured, liberal not only of his knowledge, but his purse, a great talker, a long-winded preacher, little versed in the fathers, inflexible in his opinions, and inclined to turbulence." He was one of those who attempted to reconcile the doctrine of predestination, as it had been taught at Geneva, and confirmed at Dort, with the sentiments of those who represent the deity as offering the displays of his goodness and mercy to all mankind. His opinion was maintained and propagated by Moses Amyraut, and several others of the most learned among the reformed ministers, who thought Calvin's doctrine too harsh. They were called UNIVERSALISTS. Cameron likewise maintained the possibility of salvation in the church of Rome. After his death, his theological lectures were printed at Saumur, in 3 vols. 4to. 1626-28, and afterwards with some additional pieces, at Geneva, in one vol. fol. His remarks on the New Testament, under the title of "Myrothecium Evangelicum," were printed at Geneva in 1632. Gen. Dict. Mosheim, E. H. vol. v.

CAMERON, or the *Black Pagoda*, in *Geography*, lies on the coast of Golconda, in the bay of Bengal, between Manchapatam and Cape Palmiras.

CAMERON, a river on the west coast of Africa, S.E. from Calabar river, the entrance of which is N. lat. 4°, and E. long. 11° 20'.

CAMERON Cape. See CAMARON.

CAMERONIANS, in *Ecclesiastical History*, a sect or party in Scotland, who separated from the Presbyterians in 1666, and continued to hold their religious assemblies in the fields.

The Cameronians took their denomination from Richard Cameron, a famous field-preacher, who refusing to accept the indulgence to tender consciences granted by king Charles II. as such an acceptance seemed an acknowledgment of the king's supremacy, and that he had before a right to silence them, made a defection from his brethren, and even headed a rebellion, in which he was killed. His followers were never entirely reduced till the revolution, when they voluntarily submitted to king William. The Cameronians adhered rigidly to the form of government established in 1648.

CAMERONIANS, or CAMERONITES, is also the denomination of a party of Calvinists in France, who asserted, that the cause of men's doing good or evil proceeds from the knowledge which God infuses into them; and that God does not move the will physically, but only morally, in virtue of its dependence on the judgment of the mind. They had this name from John Cameron, of whom an account has been given under the article CAMERON.

The Cameronians are a sort of mitigated Calvinists, and approach to the opinion of the ARMINIANS. See UNIVERSALISTS, *hypothetical*.

CAMEROTTA, in *Geography*, a town of Naples, in the Principato Citra; nine miles S.W. of Policastro.

CAMERTA, in *Ancient Geography*, a town to the right of the route from Otricoli to Rimini. Strabo.

CAMES, in *Geography*, a town of the island of Cuba; 40 miles W. of Bayamo.

CAMES Point, a low point two leagues N. from Manta harbour, on the coast of Peru.

CAMES, in the *Manufactures*, a name given to the small slender rods of cast-lead, of which the glaziers make their turned lead.

Their lead being cast into slender rods of twelve or fourteen inches long each, is called the *came*; sometimes also they call each of these rods a *came*, which being afterwards drawn through their vice, makes their turned lead.

CAMICUS, CAMICI, and CAMICOS, *Platonella*, or *Platoni*, in *Ancient Geography*, a town of Sicily, on the banks of a river of the same name, N.W. of Agrigentum. The river falls into the sea near Capo Bianco, so called from its colour.

CAMIGARA, a town of India, on this side of the Ganges. Ptolemy.

CAMIGUIN, in *Geography*, one of the Philippine islands, about 10 leagues in circuit, and known by two high woody mountains. N. lat. 9° 30'.

CAMILIANUM, in *Ancient Geography*, a town of Italy, in Umbria, inhabited by the Camelani.

CAMILLA, in *Entomology*, a species of PAPILIO, (Nymph. Phal.) found in Europe. The wings are indented, black, glossed with blue, with a white band on both sides, and spot of the same; posterior wings beneath at the base silvery and immaculate. Fabr. &c. This is papilio lucilla of Esper, and papilio rivularis of Scopoli. This species described by Esper under the name of camilla, is not the above insect, but the Fabrician P. lucilla.

CAMILLI and CAMILLÆ, in *Antiquity*, boys and girls of ingenuous birth, who ministered in the sacrifices of the

gods; and especially those who attended the *flamen dialis*, or priest of Jupiter.

The word seems borrowed from the language of the ancient Hetrurians, where it signified *minister*, and was changed from *camillus*.

The Tuscans also gave the appellation Camillus to Mercury, in quality of minister of the gods.

CAMILLUS, MARCUS FURIUS, in *Biography*, one of the Patrician family of the Furii at Rome, by whom it was first raised to eminence. In the year of Rome 353 he served the office of censor, and in the 10th year of the siege of Veii, A. U. 359. B. C. 395, he was created dictator, destined, says Livy, by the fates to take the city, and to save his country. After previous vows, Camillus prepared for prosecuting the siege with vigour; and having defeated the united force of the enemy in the field, he led his army to Veii. The assailants from without being aided by a chosen band who had entered the city by a mine which had been constructed under the walls, and carried as far as the citadel, Veii, which had been the rival of Rome in power, and its superior in splendour, was obliged to surrender amidst the shrieks and lamentations of the inhabitants, and after having exhibited a scene of blood and slaughter, which made even Camillus shed tears of sympathy and compassion. Estimating the opulence of the city by the spoils which it yielded to the victors, and reflecting on the importance of this conquest, which had been delayed ten years, Camillus is said to have lifted up his hands to heaven, and to have implored the Gods, that "if his own and the good fortune of the Romans appeared too great in their sight, and that it was necessary to counterbalance it by some disgrace, that they would be pleased to cause it to fall on him alone, and to spare the commonwealth." On the day after the capture of Veii, the prisoners were sold for slaves, and the sums thus raised remitted to the public treasury. The triumph of the dictator was singularly magnificent, and the chariot of the victor was drawn by four white horses; but the pomp and splendour of it offended the Roman people; and Camillus, who from this time was regarded as the head of the Patrician party, became an object of popular jealousy. Camillus, however, after having fulfilled his vows, abdicated the dictatorship. Two years after this event, Camillus was again chosen one of the military tribunes, and entrusted with the conduct of an expedition against the Falisci. Having invested Falerii, the capital of these people, an incident occurred, which afforded him an opportunity of displaying a degree of justice and generosity, that was highly honourable to himself and to the Roman character. A schoolmaster of the place, to whose care the children of all the most illustrious persons were committed, contrived, under a pretence of exercising them in those appropriate sports to which they were accustomed, to bring them to the Roman lines; and, upon being led to the Roman general, he delivered them into his hands, informing him, that with these children, he in effect surrendered to him the town which he was besieging. "Traitor," said Camillus, with a menacing aspect, "you do not address yourself with your impious present either to a general or a people that resemble you. We have indeed no express and formal alliance with the Falisci, but that which nature has established between all men both does, and shall subsist between us. War has its rights, as well as peace; and we have learned to make it with no less justice than valour. We are in arms, not against an age which is spared even in cities taken by assault, but against men, armed like ourselves; men, who without any previous injury from us, attacked the Roman camp at Veii. Thou, to the utmost of thy power, hast exceeded them by a new and different

kind of crime; but for me, I shall conquer as at Veii, by Roman arts, by valour, works, and perseverance." After this reproof, Camillus ordered the traitor to be stripped, and to have his hands tied behind him; and providing his young scholars with rods, he directed them to drive him back into the city and to scourge him all the way. Upon their arrival, the citizens, overcome by this instance of generous conduct on the part of Camillus, sent deputies to treat of a surrender. Camillus referred them to the senate, who admitted the Falisci into the number of the allies of the Romans, on condition of their defraying the expences of the war. The noble general returned to Rome with a much more substantial glory than that of his superb and pompous triumph after the capture of Veii. The army, however, was in no small degree irritated by being disappointed of its expected plunder.

Four years of turbulence succeeded the surrender of Falerii, during which Rome underwent the changes of a return to the consular government, of an interregnum, and of a renewal of the administration by military tribunes. Whilst the Gauls in their irruption into Italy had advanced as far as Clusium in Etruria, the Romans were heedless of their danger; and encouraged a prosecution against their general Camillus, on a charge of having embezzled some of the spoils of Veii. Well informed with regard to the issue of this prosecution, he resolved to prevent the indignity of a formal condemnation by a voluntary exile. Having taken leave of his family and friends, he advanced in silence towards the gates of the city; and then turning about and stretching his hands towards the capitol, he supplicated the Gods, "that if he were innocent, they would make his ungrateful country regret his absence as soon as possible." He then retired to Ardea; and the Romans imposed upon him a heavy fine. In the course of the Gallic war, a party of the Gauls, which had been ravaging the country, whilst Brennus their general was besieging Rome, was led by chance towards the city of Ardea. Camillus, as soon as he heard of their approach, roused the inhabitants to arm in their own defence. His efforts were not ineffectual; under his conduct they marched out to meet the enemy; and falling on them at night, when they had abandoned themselves to intemperance and disorder, a great slaughter ensued; the whole body of them was dispersed, and most of those who escaped were killed by the inhabitants of the country of Antium, whither they had fled. The fame of this victory soon spread through the neighbouring cities; and the Roman fugitives at Veii were encouraged to rally, and intreated Camillus to take them under his command. With this request he delayed complying, from a regard to the laws of his country, till the citizens in the capitol had confirmed their choice. But as the city was invested by the Gauls, it was difficult to gain access to this fortress. An intrepid youth, however, undertook the charge, and upon his arrival in the capitol, the senate was assembled; and he returned as speedily as possible with a revocation of the decree by which Camillus had been condemned, and an unanimous nomination of him to the office of dictator. Camillus, thus reinvested with authority, invited the dispersed Romans and their allies to his camp; and soon found himself at the head of 40,000 men. With this force he so harassed the Gauls, and by cutting off their supplies reduced them to such a state of famine and pestilence, that they negotiated with the besieged citizens in the capitol; and in the issue, the Romans consented to purchase peace by a sum of gold. Livy relates, that whilst the gold was weighing, Camillus suddenly arrived at the city gates, and prohibiting the payment, the contract for which had not obtained his concurrence as chief magistrate, drove the Gauls from the city into their camp.

camp. "Carry back," says he to the Romans, "that gold into the capitol; and as for you, Gauls, retire with your weights and scales; it is with the sword only that the Romans ought to redeem their country."

Livy adds, that Camillus pursued them in their retreat, and so completely destroyed them, that not one Gaul was left to carry home the news of their defeat. Polybius, and some other writers, assert, that the gold was actually paid, and that the Gauls marched back in safety with their booty. Camillus, however, was justly regarded as the deliverer of his country; and his soldiers, on entering the vacant city in triumph, hailed him as Romulus, the father of his country, and the second founder of Rome. This event happened A.U. 365. B.C. 389. In consequence of it Camillus purified the ground with the customary expiations, rebuilt the temples, and erected a new one to Aius Locutius. See *Aius Loquens*. He was continued in his office of dictator for a whole year, contrary to the usual custom which limited its duration to six months; and by his counsel and influence a decree was passed for rebuilding the city, and the work was undertaken with great alacrity and ardour. In the year of Rome 366, a formidable confederacy was concerted against Rome by several neighbouring states, and Camillus, with a view to the suppression of it, was a third time appointed dictator. Having raised a large army for this purpose, he speedily accomplished it; and returning to Rome in triumph a third time, he laid down his office. The spoils and the sale of the prisoners yielded a large sum of money, part of which was applied for defraying the charge of three gold vases, inscribed with the name of Camillus, as a memorial of his exploits, and deposited at the foot of Juno's statue in the capitol.

In order to quell the commotions occasioned by the ambition of Manlius, who on a former occasion had saved the capitol from the Gauls, Camillus was a fifth time elected military tribune; and he presided at the tribunal which condemned this brave, but dangerous citizen to death. His sixth election to the military tribuneship, A.U. 374, was occasioned by the union of the Volsci with the inhabitants of Præneste against the republic; and though he was now advanced in years, and wished to decline public service, he took the command, and completely defeated them. In the year of Rome 387, Camillus was advanced to the office of dictator a fourth time, for the purpose of compromising the differences that subsisted between the patricians and plebeians, and of maintaining the prerogative of the former. By his authority he prevented the tribunes from proposing their new laws to the people; but apprehending the threatened consequences of their resentment, and adverting to some informality that had occurred in the mode of his appointment, he abdicated his office. The approach of an invading army of the Gauls induced the republic again to direct their views to him as their deliverer; so that in his 80th year, he was a fifth time appointed dictator, and he cheerfully consented to sacrifice the remains of his life to the welfare of his country. On the banks of the Anio he fell unexpectedly on the Gauls, and defeated them with great slaughter. Having received the surrender of the town of Velitræ, he returned to enjoy the honour of another well-merited triumph. The turbulent state of the republic would not allow the resignation of his authority. The popular party determined on restoring the consular government; and the tribunes prepared for seizing the person of the aged dictator on his tribunal. During the tumult he retired to the capitol; and having implored the gods to appease the contest, and to avert its fatal effects, he made a vow to erect a temple to Concord, as soon as the troubles terminated. The voice of the people prevailed;

and it was agreed, in favour of the senate, that one of the consuls should be chosen out of their own body. In order to preserve the superiority of the patricians, Camillus proposed to separate the judicial from the arbitrary power in the consuls, by the appointment of a prætor, who should be elected from the higher order of citizens, and administer justice at home. The power of that party was farther augmented by the institution of two curule or patrician ædiles. Camillus, having thus honourably closed his fifth dictatorship, and erected the temple of Concord, retired from public life; but in the year of Rome 389, B.C. 365, he fell a sacrifice to a pestilence that swept away a great number of citizens and magistrates.

"His memory was ever cherished as one of the greatest, most fortunate, and most patriotic chiefs of the Roman republic." It was a proverbial saying, much to his honour, that "wherever Camillus was, there was Rome." Thus expressed by Lucan in his *Pharsalia*, lib. v. v. 27.—

—"Vejosque habitante Camillo,

Illic Roma fuit."

Pliny. Plutarch. Rollin's Rom. Hist. vol. ii.

CAMILLUS, in *Entomology*, an elegant species of PAPILIO, (Eq. Achiv.) described by Fabricius from a specimen in the Bankian Cabinet. The wings are white, with fulvous bands edged with black: on the posterior ones a black caudal spot. This is of a small size, and inhabits the interior of Africa.

CAMINA, in *Ancient Geography*, an island of the Mediterranean Sea, on the coast of Asia Minor, near Miletus, and 38 miles from Platæa. Pliny.

CAMINHA, in *Geography*, a town of Portugal, in the province of Entre Duero e Minho, seated at the mouth of the Minho, and defended by a fort and garrison; it contains about 1300 inhabitants, one parish-church, two hospitals, and two convents; 11 miles N.N.W. of Viana. N. lat. 41° 44'. W. long. 9° 15'.

CAMINI, or *yerva CAMINI*, in *Botany*, an American herb, the same with what is otherwise called PARAGUAY, or *yerva campallo*.

CAMINSTIQUIA, in *Geography*, a river of Upper Canada, which discharges itself into the lake Superior, 30 miles E. of the Grand Portage.

CAMINITZA, a town of European Turkey, in the Morea, situate on a small gulf at the mouth of a river of the same name, anciently called Olenus, and the river Mela; 24 miles N.E. of Chiarenza.

CAMINOS, in *Ancient Geography*, a place of Africa, in Cyrenaica, upon the route from the Greater Leptis to Alexandria. Anton. Itin.

CAMION, in the *Military Art*, a sort of small tumbril, or cart with three wheels, which is commonly drawn by two men, and answers for carrying bullets, &c. It is very convenient for magazines in cities and fortresses. This name is also given to a cart with three wheels, from eight to nine feet long in the body, for moving earth with horses.

CAMIRIUM, in *Botany*. (Rumph. amb. 2. p. 180. tab. 58. Gart. vol. ii. 710. tab. 125. fig. 2.) See ALFURITES.

CAMIRO, anciently CAMIRUS, in *Ancient Geography*, a town in the island of Rhodes, seated on the W. coast, 18 miles S.W. of it, and almost opposite to Lindus. This was formerly one of the three cities called *Tripolis*: the other two were denominated *Lindus* and *Jalissus*. Of this town there remains no traces besides the name of Camiro, a Greek village, built upon the same spot.

CAMIS, or KAMIS, in the *Japanese Theology*, denote deified souls of ancient heroes, who are supposed still to interest themselves

themselves in the welfare of the people over whom they anciently commanded. The camis answer to the heroes in the ancient Greek and Roman theology, and are venerated like the faints in the modern Romish church. Beside the heroes or camis beatified by the consent of antiquity, the *mikaddos*, or pontiffs, have deified many others, and continue still to grant the apotheosis to new worthies; so that they swarm with camis: the principal one is *Tensio Dai Sin*, the common father of Japan, to whom are paid devotions and pilgrimages extraordinary.

CAMISA, PORTO, in *Geography*. See LISA.

CAMISADE, in the *Military Art*, a term denoting a sudden or unexpected attack in the night, and for which a common badge, mark, or signal, is agreed on to enable the troops employed in making it to know one another by, particularly in the dark. A white shirt or chemise, still called camise in some of the provinces of France, as most discernible, was commonly made use of, from which circumstance the word took its rise.

CAMISANO, in *Geography*, a town of Italy, in the Vicentin, belonging to the state of Venice: 7 miles S.E. of Vicenza.

CAMISARDS, or CAMISARS, an appellation given by the French to the Calvinists of the Cevennes, who formed a league, and took up arms in their own defence, in the year 1688. In their boldness, crimes, and enthusiasm they resembled the Circumcellions of Africa. The etymology of the name is disputed; but it is most probably formed from camifade. See CAMISADE.

CAMISENE, in *Ancient Geography*, a province of Asia, in Armenia; which had a famous fortress, destroyed before the time of Strabo. Antonine mentions a village or town of this name upon the route from Nicopolis to Arabifus. In the Table of Peutinger it is called Comassa, and placed 23 miles from Sebastia.

CAMISOLE, in *Conchology*, the name given by Argenville to the Linnæan *Trochus Pharaonis*.

CAMITA, or COMITA, *island*, in *Geography*, lies 3 leagues N.E. from Cape Rosa, near the N.W. part of the peninsula of St. Domingo island.

CAMLET. See CAMBLET.

CAMLETINE, a slight stuff, formerly made of hair and coarse silk, and resembling camblet; but now out of fashion.

CAMLIN, in *Geography*, a river of Ireland, in the county of Longford, on which the town of Longford is seated, and which falls into the Shannon.

CAMMA, and GOBBI, two provinces of Africa, in the kingdom of Loango, lying between the province of Sette and the cape of Lobo Gonzales; whose inhabitants are at perpetual war with each other, and whose country is intersected with lakes and rivers, that afford plenty of fish, but are infested with sea-horses, which are very mischievous both on land and water, particularly to the canoes and other vessels, which are continually plying to and fro upon the rivers and marshes. The language, manners, and customs of both these provinces are almost the same with those of Loango. They both allow of polygamy, and they are very free in the disposal of their wives for the accommodation of their friends or strangers. Their military weapons are the short pike, bow and arrows, sword and dagger; and the Europeans have furnished them with fire-arms, gun-powder and ball, beside brass pots and kettles for domestic use, and several sorts of coarse cloths. The chief town of Gobbi lies about a day's journey from the sea. The land breeds little else but

beasts of prey. The principal commerce with the natives, beside the logwood, consists chiefly in elephants' teeth and tails, the hair of which is highly valued, and used for several curious purposes.

CAMMA, a river of Africa, which separates the kingdom of Benin from Loango, and runs into the Atlantic. S. lat. $1^{\circ} 40'$. E. long. $11^{\circ} 40'$.

CAMMANIA, in *Ancient Geography*, a country of Greece, which formed a part of Thesprotia. It is the Cestrine of Pausanias, and was called Cestrinia, according to Steph. Byz.

CAMMAS WATER, in *Geography*, lies at the mouth of the river running from Morpeth, in Northumberland, and has a small port for shipping, corn, and grinding stones.

CAMMIN, a town of Germany, in Prussian Pomerania, seated near the mouth of the Oder, on the lake of Boden, about 3 miles from the Baltic, near the see of a bishop, suppressed by the peace of Westphalia, and united to the dominions of Prussia; 35 miles N.E. of Stettin. N. lat. $53^{\circ} 56'$. E. long. $14^{\circ} 48'$.

CAMMIN *sound*, is one of the small channels that lead from the Baltic into the channel of the river Oder, up to Stettin.

CAMMOCK, in *Botany*. See *ONONIS spinosa*.

CAMMONI, in *Ancient Geography*, a village placed on the Erythræan sea, in the gulf of Barygaza, according to the peripplus of Arrian; and probably the same with the *Camane* of Ptolemy.

CAMMOROS, in *Botany*, a name given by some of the old writers to a poisonous plant called by the Romans *cicut*, or hemlock; so that it became hence a name for the mandrake, and some of the nightshades, with some authors. Many of the moderns, and even some among the ancients, have erred greatly in confounding the *cammos* with the *cammaros*, which is an insect, in figure resembling the root of this aconite. See COMOCLADIA.

CAMOCLADIA. See COMOCLADIA.

CAMCENA, in *Entomology*, an African PAPILIO, of the *Heleconii* tribe, described by Fabricius, the wings of which are somewhat entire, fuscous, and dotted with black, with a red band on the posterior pair.

CAMCENÆ, in *Ancient Mythology*, a name given to the Muses, because it was their principal occupation to celebrate in song the actions of the gods and heroes. The camcænæ of Latium, mentioned by Plutarch in Numa, who were supposed to have shewn the sacred fountain to the Vestals, were probably, says Bryant (*Anal. Anc. Mythol.* v. i. p. 64.), the original priestesses, whose business it was to fetch water for lustrations from that stream. For Cam-Ain (he says) is the fountain of the Sun, and the camcænæ were named from their attendance upon that deity. The hymns in the temples of this god were sung by these women; and hence the camcænæ were made presidents of music.

CAMCENARUM LUCUS, in *Ancient Geography*, the name of a wood in the vicinity of Rome, at the Capena gate, in the midst of which was the fountain of Egeria, consecrated by Numa. Livy, l. i. c. 21.

CAMOENS, LEWIS DE, in *Biography*, a Portuguese poet, was descended of an ancient family of Galicia, in Spain, under the name Caamans, but changed to Camoens, in 1370, when a branch of the family left Spain and attached itself to the king of Portugal. Camoens, the poet, sprung from a younger branch of this family, which had been unfortunate; his father having suffered shipwreck at Goa, with the loss of his whole property; and was born, as some say, in 1517; or according to others, in 1526 or 1527; nor is the place of

of his birth less contested than the time of it. Some say, that he was born at Coimbra, and others, at Santaren; but Emanuel de Correa, his intimate friend and companion, says, that he was born at Lisbon, and that his mother, Anne de Maudo, was of a noble family. He studied in the University of Coimbra, where he was distinguished by his application to the classics and to the philosophy of the times; but his genius principally inclined him to poetry, and, therefore, upon his return to Lisbon, he became known at court by his poetical talents and his gallantry. Being no less agreeable in his person than in his conversation and writings, he was betrayed into imprudences of a licentious kind, which caused him to be exiled, as it has been generally thought, to Santaren in Estremadura, the place of his mother's nativity, and the residence of some of his relations. On this occasion he compared himself, in one of his elegies, to the banished Ovid. Disgusted with an inactive life, and being naturally brave, he obtained permission to serve in a fleet that was sent to the succour of Ceuta, in Africa, and in a naval engagement he had the misfortune to lose one of his eyes. His stay at Lisbon, whither he returned after this naval expedition, was of short continuance; some new cause of dissatisfaction arose, and he was again obliged to leave it; and, therefore, with complaints of the ingratitude of his country, he resolved to embark for the East Indies in a fleet commanded by Cabral, which sailed in 1553. At Goa he volunteered his services in an expedition to the coast of Malabar; and after his return, in 1555, he embarked on a second expedition to the Straits of Mecca, in the Red Sea, where, military exertion not being necessary, he employed his time in writing, and in visiting some of the adjacent parts of Africa, which he has beautifully described. Having spent the winter at Ormuz, he returned to Goa; but indulging his disposition in composing some satirical pieces against Bareto, the Portuguese viceroy of India, and several other principal persons of Goa, he was banished by order of the viceroy to Macao in China. Here he obtained the profitable office of commissary of the estates of the deceased, and in the exercise of it acquired some property. During a residence of five years at Macao, he finished his "Lusiad," which he had begun some years before in Portugal. Upon the removal of Bareto, he determined to return to Goa, and having freighted a ship for this purpose, he was unfortunately shipwrecked at the mouth of the river Meco, on the coast of Camboja, and lost his whole property; however, he saved his life, and his poems, which he bore through the waves in one hand, whilst he swam ashore with the other. The natives treated him with hospitality; and on this remote coast he wrote his beautiful paraphrase on the 137th Psalm, which represents the Jews as hanging their harps on the willows by the rivers of Babylon. Upon his arrival at Goa, he was kindly received by Don Constantine de Braganza, the new governor; but his successor, count Redondo, conceiving prejudices against him, on account of some malversation in his office at Macao, with which he was charged by his enemies, threw him into prison. Having cleared himself of the charge alleged against him, he was detained for debt; and it was in consequence of an humorous petition, which he presented to the viceroy, that he obtained his liberty. His next adventure was that of accompanying the governor of Sofala to that settlement; but he was deceived by promises which were never fulfilled, and treated with singular severity. When the governor found that Camoens was determined to leave him, he endeavoured to detain him by making a charge of debt for his board, and threatening to confine him in prison. These unreasonable claims were satisfied by some Portuguese gentlemen, who invited him to

accompany them to Europe; and accordingly he arrived with them in Lisbon in 1569, after an absence of 16 years. One principal object, which made him desirous of revisiting his native country, was the publication of his "Lusiad," which appeared in 1572. This poem, which came to a second edition in the same year, was dedicated to king Sebastian, who, it is said, allowed him a small pension of 4000 reals, on condition of his living at court. With this pittance, if it had been continued, Camoens would have lived in peace and comfort; but Sebastian soon lost his life in Africa, and upon the accession of Henry, the poet was forgotten, and his pension was withheld. Thus reduced to a state of deplorable indigence and distress, a poet, who had produced what at its first appearance was thought to do honour to the nation, spent the residue of his life, humbled and mortified amongst a few Dominican monks, either in an alms-house, or under the charitable roof of a nunnery. It is said, that his black servant, a native of Java, who had been his companion for many years, and who assisted in saving his life when he was shipwrecked, begged in the streets of Lisbon for the support of his master, who died in 1579. It is said, that his death was accelerated by the anguish with which he foresaw the ruin impending over his country. In one of his letters he uses these remarkable expressions: "I am ending the course of my life; the world will witness how I have loved my country. I have returned not only to die in her bosom, but to die with her." He was buried as obscurely as he had closed his life, in St. Anne's church; and the following epitaph was inscribed over his grave:—

" Here lies Lewis de Camoens,
Prince of the poets of his time.
He lived poor and miserable, and died such,
Anno Domini, 1579."

Some years afterwards a respectable monument was erected over his remains, at the expence of a Portuguese nobleman. "His memory was honoured by numerous eulogies from the poets of Spain and Portugal, and the name of Camoens is still pronounced with enthusiastic veneration by all the votaries of Portuguese literature." Of the various poetical compositions, written by Camoens, the epic poem, entitled "Lusiad," is the only one which makes him known in modern times. The subject of this poem is the discovery of the East Indies by the Portuguese, under Vasco de Gama; and the fleet is conducted by the poet round the coast of Africa to Calicut, on the Malabar coast. In the course of the voyage the author introduces a great variety of descriptions, which his knowledge of the parts of the world to which they relate renders noble and interesting. Some of his poetical fictions are conceived with true genius; and the giant Adamastor, the guardian of the Cape of Tempests (since called the Cape of Good Hope,) is a creature of fancy as sublime as the imagination of a poet has produced. "On the whole," says Dr. Aikin (Gen. Biog.), the want of a well-connected plan, the neglect of proper decorum, the monstrous mixture of the Heathen with the Christian mythology, and the general baldness and want of elevation in the style, place this work far beneath the principal epics of ancient and modern times." "The whole work," says Dr. Blair (Lectures on Rhetoric, &c. vol. iii. p. 273.), "is conducted according to the epic plan. Both the subject and the incidents are magnificent; and, joined with some wildness and irregularity, there appear in the execution much poetic spirit, strong fancy, and bold description." "There is no attempt towards painting characters in the poem; Vasco is the hero, and the only personage indeed that makes any figure. The machinery of the Lusiad is perfectly extravagant; not only

is it formed of a singular mixture of Christian ideas, and Pagan mythology; but it is so conducted, that the Pagan gods appear to be the true Deities, and Christ and the Blessed Virgin to be subordinate agents. One great scope of the Portuguese expedition, our author informs us, is to propagate the Christian faith, and to extirpate Mahometanism. In this religious undertaking, the great protector of the Portuguese is Venus, and their great adversary is Bacchus, whose displeasure is excited, by Vasco's attempting to rival his fame in the Indies. Councils of the gods are held, in which Jupiter is introduced, as foretelling the downfall of Mahometanism, and the propagation of the Gospel. Vasco, in great distress from a storm, prays most seriously to God; implores the aid of Christ and the Virgin, and begs for such assistance as was given to the Israelites, when they were passing through the Red Sea, and to the Apostle Paul, when he was in hazard of shipwreck. In return to this prayer, Venus appears, who discerning the storm to be the work of Bacchus, complains to Jupiter, and procures the winds to be calmed. Such strange and preposterous machinery shows, how much authors have been misled by the absurd opinion, that there could be no epic poetry without the gods of Homer. Towards the end of the work, indeed, the author gives us an awkward salvo for his whole mythology; making the goddess Thetis inform Vasco, that she, and the rest of the Heathen deities, are no more than names to describe the operations of Providence."

"There is, however, some fine machinery, of a different kind, in the *Lusiad*. The genius of the river Ganges, appearing to Emanuel king of Portugal, in a dream, inviting that prince to discover his secret springs, and acquainting him, that he was the destined monarch for whom the treasures of the East were reserved, is a happy idea. But the noblest conception of this sort, is in the fifth canto, where Vasco is recounting to the king of Melinda, all the wonders which he met with in his navigation. He tells him, that when the fleet arrived at the Cape of Good Hope, which never before had been doubled by any navigator, there appeared to them on a sudden, a huge and monstrous phantom rising out of the sea, in the midst of tempests and thunders, with a head that reached the clouds, and a countenance that filled them with terror. This was the genius, or guardian, of that hitherto unknown ocean. It spoke to them with a voice like thunder; menaced them for invading those seas which he had so long possessed undisturbed; and for daring to explore those secrets of the deep, which never had been revealed to the eye of mortals; required them to proceed no farther; if they should proceed, foretold all the successive calamities that were to befall them; and then, with a mighty noise disappeared. This is one of the most solemn and striking pieces of machinery that ever was employed; and is sufficient to show that Camoens is a poet, though of an irregular, yet of a bold and a lofty imagination."

This poem has been translated into many languages, and illustrated by elaborate commentaries. Two English versions of it have appeared; one by sir Richard Fanshawe, in the 17th century; and another in the latter part of the 18th by William Julius Mickle, A. D. 1776, 4to. "This last," says Aikin, "is one of the best versified poems in the English language; but the liberties taken with the original, in large additions, alterations, and omissions, besides a perpetual superiority of poetic language, render it a very flattering representation of the poem of Camoens." Gen. Dict. Introd. to Mickle's *Lusiad*.

CAMOENS'S Cave, in *Geography*, a cave below the loftiest eminence in the town of Macao in China, so called from a tradition current in the settlement, that the Portuguese poet

of that name wrote his celebrated poem of *Lusiad* on that spot. This interesting cave is in the middle of a garden; which commands a very extensive prospect.

CAMOGGI, a town of Italy, in the state of Genoa, near the sea-coast; 13 miles E. of Genoa.

CAMOIL, a town of France, in the department of Morbihan, and district of Vannes, $1\frac{1}{2}$ league W.S.W. of Roche-Bernard.

CAMOMILE, in *Botany*. See ANTHEMIS.

CAMOO, in *Geography*, a town of Japan, in the province of Oomi.

CAMORA. See ZAMORA.

CAMORTA, a small island in the bay of Bengal. N. lat. $8^{\circ} 8'$. E. long. $94^{\circ} 3'$.

CAMOTES, a group of islands belonging to the Philippines in the East Indian ocean, situate between Zebu or Cebu, and the coast of Oguiah and Leyte; the chief of which is Poro, dependent on Zebu.

CAMOUCLÉ, in *Ornithology*, the horned screamer, according to Bajon. See *PALAMEDEA cornuta*.

CAMOUFLET, a smoky paper held under the nose of one that sleeps. But when this word is made use of as a term of war, it signifies an affront, a mortification, a disappointment. An enemy's miner is said to give a camouflet to ours, when he finds means to descend or get down into his adversary's gallery, to make some small mines blow up, and thereby to stifle or suffocate him.

CAMP, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and archbishopric of Treves, on the east side of the Rhine, opposite to Boppard.

CAMP, in the *Military Art*, the ground where a corps, body of troops, or army, pitch their tents, and live or dwell in the same, either for a shorter or longer space of time. In a more general acceptation of the word, it may be defined to be the spot or ground where any number of persons, however small, stop or remain in tents, wigwams, huts, or otherwise, for one night or a longer time, whether they be in a state of warfare, or engaged in their ordinary pursuits of life. Thus, for instance, the savages or wandering natives of America are said to encamp; and the spots where they have their wigwams, or remain even for one night or two, are called their camps or encampments. Many of them are in as simple and uncultivated a state of life as it is possible for human creatures to be in. For men neither ever did nor ever can exist but in a state of society of some kind or other. Ever since there have been men, however, there have been disputes or quarrels. These led to violence and warfare, and obliged those who lived even in the simplest and rudest state of society, to think of and contrive means for securing their encampments against surprise or insult. For this purpose they would naturally make use of stakes, bushes, an abatis, a ditch, and occupy situations difficult of access, and advantageous in other respects. The first contrivances and efforts of genius, however, in the way of defence must have been rude, defective, and of little moment, suited to the simplicity of those by whom they were made, who possessed neither the experience that could lead to the conception of great designs, nor the means necessary for executing them. Ditches, bordered with brush, bushes, an abatis, or a single row of stakes, surrounded their huts, tents, or cabins, and formed their whole security. The Indians in America furnish, at this moment, many examples of this manner of fortifying. As men advanced in social improvements, and began to have fixed or permanent habitations, they would naturally think of constructing walls with wood, earth, and afterwards with stones. Julius Cæsar in his time found wooden walls in use among the Gauls; and there are some parts now in Russia, where
the

the towns are defended or secured by walls of wood or timber.

The words made use of by the Grecian writers to express a camp, or the camp, are always in the singular number, as τὸ στρατόπεδον, ἡ παρεμβολή. But the Roman military writers constantly use the word *castra*, in the plural number, to signify a camp, or the camp. Some have attempted to derive the word *castra* from *castro*, making it of the same import as *castra*, quod ibi castraretur libido, and because the Roman soldiers were not originally permitted to marry. But the word *castra* is the plural of *castrum*, which Cicero has made use of: and *castrum* or *castra* is easily and evidently derivable from *casas* *astruere*, to erect or build huts or tents adjoining to one another or close together. But no good or even plausible explanation has been given of the cause or reason why the Roman historians invariably employ the word *castra* in the plural number, and not *castrum* in the singular, not only when they mention both the consular camps when separate, but also when they speak only of one of them or of both joined together as one. The following circumstance, however, probably gave rise to that practice, or customary mode of expression, for a camp or the camp. The tribes originally when they went out encamped separately and apart from one another, each by itself. The different positions or spots of ground they occupied, were naturally called the camps, or *castra*; which term or expression growing into use was retained when they were encamped together and surrounded by one and the same ditch and rampart.

It is not probable that either the Romans or any other people originally enclosed their camps on every occasion with regular ditches and ramparts, but rather that they frequently chose strong and advantageous situations, and depended on watchfulness and valour for their security. It was a very ancient custom, however, among the Greeks, to surround their places of encampment occasionally with a ditch or trench, which they called *ορυμνα*. Homer speaks of the camp which they formed before Troy, and makes them post the best and bravest of their troops on the two flanks or wings. The Lacedæmonians, who were trained up in martial exercises from the time they were seven years of age, and studied war as an art or science more than any other of the states of Greece, were not only well acquainted with the genuine maxims and principles of warfare, but also skilful, dexterous, and expert in all the methods of carrying them into practice long before the Macedonians, the Carthaginians, and the Romans. They also received from their celebrated lawgiver, Lycurgus, the first mixed form of government composed of the three simple ones, viz. monarchy, aristocracy, and democracy, that existed in Europe. It lasted for many ages; and whilst they adhered to his laws and institutions, they were alike free from internal dissensions among themselves, and proof against subjugation by external force. The Macedonians borrowed from them the best part of their military regulations and discipline. The Carthaginians imitated them, and on one occasion a certain Lacedæmonian, named Xantippus, who joined them with a body of mercenaries from Greece, by his superior skill in the art of war, and dexterous management, defeated the Roman consul Regulus, who till then had been uniformly victorious over them, and saved their state when it was brought to the very brink of destruction. The Romans, at an early period, not only adopted several of their military maxims, precepts, and institutions, but also committed them to writing, carefully keeping records of them, and retained them ever after. It has been said, on the authority of some writers, that their camp was of a circular form, which was prescribed by Lycurgus, as fitter for defence than any other. This reason, however,

ascribed to that great lawgiver, is not a good or just one. For a direct defence from a straight line is much better than from the convexity either of a circle or ellipse. Besides this, the observation militates against facts, and the practice of the Lacedæmonians themselves in the different wars in which they were engaged. For, like the rest of the Greeks, they did not observe any invariable form or method in their encampments, but chiefly consulted the nature and strength of the ground they encamped on, and gave to their camp the form and arrangement that best suited the same, employing, on different occasions, every sort of figure which the positions they occupied required. This erroneous idea, in regard to the figure of the Spartan camp, was probably derived from the circumstance, that the city of Sparta itself was of a circular form. It is not very probable, however, that the Spartans often intrenched their camps, as they did not even secure their city with a wall, or rampart, depending on their own vigilance and valour, more than on walls, for its protection. That they sometimes did, however, cannot be denied. For Cleomenes, when opposed to Antigonos, not only occupied strong positions, but also made use of intrenchments, and even abatis. Many other instances might likewise be mentioned. We know, indeed, from the best authority, that the Greeks in general accommodated the figures and distributions of their camps to the situations they encamped on, sometimes securing them with trenches and ramparts, but often not. They occasionally suffered severely by neglecting this precaution, of which the Messenians furnish a striking example, when they marched with their forces to join Philip of Macedon, though they encamped close under the walls of a friendly fortress. Polybius, in the sixth book of his general history, in speaking of the great regularity of a Roman camp, the rules the Romans regularly observed in forming it, their invariable custom of surrounding it with a ditch and rampart, and the great ease and facility with which these were made, by each soldier's knowing always on what part he was to perform his labour, as well as his own place in the camp, and that of the body he belonged to, contrasts their practice with that of the Greeks; and tells us, that these, when they encamped, chiefly considered the natural strength of the place they fixed on, and accommodated to it the arrangement and disposition of their encampment, wishing partly to avoid the labour of making intrenchments, and partly persuaded that works raised by art are seldom so strong or secure as those that are formed by nature. He says, that in compliance, therefore, with what the situations demanded, they were not only obliged to give every sort of figure to their camps, but also to vary the position of the several parts of them, as the place for each was favourable or improper; and that from thence it happened that the soldier never knew to a certainty his own place in the camp, or that of the body to which he belonged. But the Romans, he informs us, willingly submitted to the task of making intrenchments, and to other toilsome labour, for the sake of the great advantage that was found to arise from their employing a method that was never changed, and which rendered all the parts of the camp quite familiar to the army. The Macedonians, who learnt the art of war from the Greeks, and particularly from the Spartans, like them gave their camp every sort of figure to make it suit the ground they encamped on, sometimes intrenching it, and sometimes not, as circumstances seemed to require.

Even before Alexander the Great invaded Persia, the Grecian colonists in Asia and the nations in it who were in the practice of employing Greeks in their armies, encamped nearly in the same way, varying the forms of their encampments with those of the positions they occupied with them,

securing them with intrenchments on some occasions, and on others not. But after the death of that prince, who seemed to have been born for the conquest of men, both the Egyptians and all those nations of Asia that had been visited by his arms, followed very nearly the Macedonian or Grecian method of encamping, and generally when at no great distance from their enemies, or in danger of being attacked, strengthened and secured their camps with ditches and ramparts. Thus the camp of Molon, who was governor of Media, and had revolted against Antiochus, the son of Seleucus, was intrenched on the bank of the Tigris. Theodotus the Ætolian, governor of Cælo-Syria, secured the troops he had posted in the narrow part of the vale of Mar-syas, between the fortresses of Bronchi and Gerrha, so well with intrenchments and palisades, that the said Antiochus in trying to penetrate that way, sustained so great a loss, that he was obliged to desist from the attempt. Both this king and Ptolemy Philopater, in their contest for the sovereignty of that province, intrenched their camps. And many other instances of this practice, subsequent to the time of Alexander, might be given.

The Carthaginians, who had an intercourse with the Greeks, long before their obstinate contention with the Romans in Sicily for the possession of that island, followed a similar mode of encamping, changing, like them, the forms of their camps, to make them suit the situations they occupied, surrounding them sometimes with ditches and ramparts, and sometimes not, as circumstances made such precautions necessary or otherwise. It is probable they paid more attention than formerly both to the security of their camps, and to regularity in forming them after they came to be engaged in long and obstinate contests with the Romans. It does not appear, however, that the Carthaginian generals, when they sat down, contrary both to common sense and the rules of military science, with their elephants and cavalry, as well as their infantry, on a rough and craggy eminence near Adis, which Regulus was besieging, took measures for strengthening their camp with any works whatsoever. But it is evident that the camp of Xantippus, who soon afterwards defeated Regulus, and destroyed his army, was intrenched as well as that of the Romans. There never perhaps existed a general who was more capable than Amilcar Barcas, of choosing proper and advantageous ground for encampments, or who knew better how to secure and defend them. His son Annibal, who, though he often surprised his enemies, was himself never once surprised, always secured his camp so well with an intrenchment and palisades, that during the sixteen years he waged war against the Romans in Italy, though he never once dismissed his army from the field, no serious attack was ever made on it but on one occasion by Minucius, when most of his troops were out of it a-foraging. As he very judiciously adopted the arms and armour of the Romans for his heavy-armed infantry, after the first battle he fought with them, it is more than probable that he also followed their mode of encamping, in which they appear to have been as superior to any other people among the ancients, as they were in their arms and order of battle. And as some part of their method is still retained by all nations in Europe in encamping their troops, it may not be improper or unnecessary to give a correct plan and description of a Roman camp, and of the disposition or arrangement of its different parts from Polybius, a faithful and judicious historian, and the only one among the ancients who has left us a distinct account thereof. Beside his strict adherence to truth in all his narratives, he was a person of great political and military talents, wrote at a period of time when the government of Rome was in its greatest vigour, and possessed a thorough knowledge of

all its component parts, customs, and institutions. This is perhaps the more requisite, as Justus Lipsius, who was a man of much learning, but of little military information, has led almost every modern writer wrong, that has treated either on the castrametation or order of battle of the Romans.

Though it is highly probable that from the very beginning they secured their camps more or less with intrenchments, and particularly from the time they began to carry on their operations at some distance from their own city, and the tribes came to encamp together on the same spot, or within one and the same inclosure, yet if we are to credit some historians, there was but little interior regularity or orderly arrangement of the different parts in them, before the 124th Olympiad, when Pyrrhus, king of Epirus, on the invitation, and in support of the Tarentines, invaded Italy. That prince was certainly endowed both with military talents of an extraordinary nature, and with the most undaunted courage; fertile in stratagems and expedients, most skilful in every branch of discipline, and perfectly conversant in all parts of the art of war. He waged war with various states, with most powerful kings, and great commanders, and generally was victorious without being ever, strictly speaking, vanquished himself. In all his battles with the Romans he employed not only the arms but the troops of Italy, and placed, in alternate order, companies of them, and cohorts armed and drawn up after the manner of the phalanx. Even with this contrivance, however, though he rather worsted them in some engagements, he never was able to obtain any very clear or decided advantage over them; such were the inherent excellence of their order of battle, and the advantageous nature of their arms and armour in close combat. By their firmness and steady perseverance, they at last forced him to quit Italy, and leave the Tarentines with the inhabitants of other cities, that had been confederated with him against them, to their fate. And getting possession of one of his camps, they, from the interior arrangement of it, improved the disposition of their own, and gradually brought their castrametation to perfection.

The Romans were the only people we have any account of, who invariably observed one mode or manner of encamping, and constantly intrenched themselves wherever they encamped, if they halted only for a single night.

The intrenchments, however, with which they surrounded their temporary or large camps in the field were not so strong as those which they made round their *castra stativa*, their forts or smaller camps, called *castella*, in which a few cohorts or small garrisons were frequently left for some time to defend themselves, without any other aid or assistance, and which were sometimes enclosed with two, three, four, and even five or more distinct ditches and ramparts.

They had their *castra æstiva*, and their *castra hiberna*. The first of these they occupied in summer, when they were carrying on their operations in the field; and the last were either towns they took possession of, or such as they raised themselves in proper situations, and fortified for the purpose of quartering their troops in during winter. Their *castra æstiva* were likewise of two sorts, namely, those which they occupied from day to day, or for a short time only, being temporary camps, and called simply *castra*, and those they occupied for a considerable space of time, and which are repeatedly called *castra stativa*. The former of these were more slightly intrenched than the latter.

"This, then," says Polybius, book vi. "is their (the Roman) kind of castrametation."

Ground being always chosen for the encampment, the general's tent occupies the part of it most convenient for prospect and command. A standard being placed where they are

are to fix it, a quadrangular place is so measured off round this standard, that all the sides may be one hundred feet distant from the standard, and the area be four acres. See N^o 1. in the plan of a Roman camp.

And always before one face and side of this figure, which appears the most commodious for supplies of water and forage, the Roman legions are placed in this manner: there being six tribunes, as has been already observed, in every legion, and two Roman legions always with each of the consuls, it is evident, that twelve tribunes of necessity serve with each of the consuls. They place, therefore, all their (the tribunes) tents along one right line, which is parallel to the side of the quadrangle that has been fixed on, and distant from it fifty feet. This place is for the horses, with the beasts of burthen, and the rest of the equipage of the tribunes. See N^o 2 in the plan.

These tents being placed with their back parts towards the aforesaid figure, are ranged fronting outwards towards the side, which shall always be noticed as, and called by us, on every occasion, the front of the whole scheme. And the tents of the tribunes are equally distant from one another to extend along as much space as the whole breadth always of the Roman legions. See N^o 3.

The tents of the præfecti of the allies, in like manner, extended the whole breadth of their cavalry and infantry, and had the same width of fifty feet behind them for their horses, beasts of burthen, and baggage, that was left behind those of the tribunes. See N^o 4 and 5, in the plan.

Again, one hundred feet being measured off forwards, in front of all these tents, they then from the right line, limiting this breadth, which is parallel to the tents of the tribunes, begin to make the camps of the legions, using this method. See N^o 6.

Having bisected the aforesaid right line, by a line drawn at right angles to it from this standard, they encamp the horse of each legion opposite to, and fifty feet distant from each other, dividing this distance in the middle by a line. The arrangement of the tents, both for the horse and foot, is alike; for the whole figure, both of a maniple and of a troop, is quadrangular. This looks into the streets, and has a determinate length along the street; for it is one hundred feet. And, in general, they endeavour to give it an equal depth, except for the allies. And when they make use of fuller legions, they add both to the length and depth in proportion. See N^o 7 and 8.

This encampment then being made of the horse opposite to the middle tents of the tribunes, like a certain street crossing the aforesaid right line, and the place before the tribunes; (for the figure of all the intervals, on each side, is, in truth, made like to streets, along some of which the maniples, and some of them the troops of horse are encamped); they place behind the said horse the triarii of both legions, a maniple against each troop in the same figure of equal length, the figures joining one another, but looking in contrary directions to the opposite fronts of the horse, and make the depth of each of these maniples equal to half its length, as their number is always the half only of that of each of the other parts. Wherefore, though the numbers of the men often vary, it happens that all these parts are always equal in length by the variation of the depth. See N^o 9.

Again, setting off fifty feet from each of these, they encamp the principes opposite to the triarii. And these looking towards the said intervals, two other streets are likewise formed. But, in the same manner as the cavalry, they take their beginnings and commencements from the same right line and interval of one hundred feet in front of the tribunes. And they terminate towards that side of the intrenchment opposite to the tribunes, which, from the first, we have supposed to be at the front of the whole figure. See N^o 11.

Next to the principes, and behind them, they, in like manner, encamp the hastati looking a contrary way, placing the figures close together. And there being ten maniples in each of all the parts, (of a legion) according to the division from the beginning, it happens, that all the streets are equal both as to length, and as to their terminating evenly towards the side of the intrenchment at the front, turned towards which they encamp the last maniples. See N^o 12.

Again, leaving fifty feet from the hastati, they encamp opposite to them the horse of the allies, beginning at the same right line *with them*, and ending at the same right line. But, as I have observed above, the number of the foot of the allies is equal to that of the Roman legions lessened by that of the extraordinarii. And that of their horse is double. A third part being taken from these for extraordinarii, by increasing in proportion the depth of the figures, in which they encamp them, they endeavour to make them equal, as to length, the Roman legions. See N^o 14.

All the five streets being now completed, they again, increasing the depth in due proportion, place the maniples of the allied foot ranging rear to rear to the horse, and looking towards the intrenchment, and both fronts of its transverse sides. And in each maniple the centurions occupy the first tents on either side. See N^o 15.

But in following the aforesaid method of encamping, they separate on each side the sixth troop fifty feet from the fifth, and, in a similar manner, the maniples of foot; so that this becomes another opening through the middle of the legions crossing these streets, and parallel to the tents of the tribunes, which they call the fifth, (or *via quintana*), from its extending along the fifth maniples. See N^o 16.

But the place behind and back from the tents of the tribunes lying adjacent to each side of the general's ground, becomes one part of it a place for the forum, and the other for the quæstor, and the things under his charge. See N^o 17 and 18.

From the last tents of the tribunes, on either side, having an arrangement as it were inflected backwards perpendicularly to these tents, all the choice men of the extraordinary horse, and some of those serving as volunteers, from regard and respect to the consuls, encamp according to (or parallel to) the faces of the intrenchment on the transverse sides, part of them fronting the stores of the quæstorium, and part of them on the opposite side looking into the forum. And it for the most part happens to these not only to encamp near the consuls, but also on marches, and on other necessary occasions, to perform their whole duty and service about the consul and quæstor. See N^o 19.

And the foot performing a similar service with the fore-mentioned horse, are placed opposite to them, looking towards the intrenchment. See N^o 20.

Then from these is left a street one hundred feet wide, and parallel to the tents of the tribunes extending along the opposite sides of the forum, prætorium, and quæstorium, to the above-mentioned parts of the intrenchment. See N^o 21.

And along the upper side of this, the extraordinary horse of the allies encamp, looking towards the forum together with the prætorium, (or general's ground), and the quæstorium. See N^o 22.

At the middle of the encampment of these horse, and at the same ground adjoining the prætorium, a street of fifty feet is left reaching to the rear side of the encampment, its direction lying at right angles to the aforesaid broad street. See N^o 23.

With their backs to these horse again, the extraordinary foot of the allies are placed looking towards the intrenchment and the rear-aspect of the whole encampment. See N^o 24.

And the vacant space left on each side of these towards the transverse sides, is given to strangers and allies occasionally arriving. See N^o 25.

All being thus disposed, the whole figure of the encampment becomes an equilateral quadrangle. And as to what relates to the intersection of the streets in it, and its distribution in other respects, it has an arrangement resembling a city. They place the intrenchment on every side two hundred feet distant from the tents; and this vacant space affords them many and great conveniences. It is commodious and useful for the ingress and egress of the legions. For each of them move out into this open space through their own streets, but do not push down and trample on one another by crowding into one. Carrying also to this place the booty of cattle they bring in, and the spoils they take from the enemy, they keep them safe during the nights. But the greatest is this, that in nocturnal assaults neither fire nor weapons, except a very few, can reach them. And it happens, that even these are almost harmless, from the greatness of the distance, and the surrounding tents."

Polybius, in this description of a Roman camp, supposes a legion to consist of four thousand two hundred foot, and three hundred horse. He observes, however, that, from it, those who choose to examine it will easily be able to understand the extent and whole perimeter of a camp, even when the legion consists of a greater or less number. When more of the allies than are usual either accompanied them from the beginning of an expedition, or afterwards arrived in the camp, he informs us, that besides assigning to the latter the places already mentioned, they filled with them, also, those on each side of the prætorium, bringing the forum and quæstorium together into one place, as the occasion and necessity required; and that as to the former, when their number exceeded what was customary, besides the locations usually made for them, they laid out an additional street for them beyond the legions both on the right and left side of the camp.

But when the four legions and both consuls were assembled together within one and the same intrenchment, he says, that nothing more is necessary for understanding their method of encamping than to suppose two armies disposed of in the manner now described, with their rears where the extraordinary as he has mentioned of each were placed, joined together. Whenever this happened, he tells us, the figure of the camp, instead of being a square, became a rectangle, having its area double that of the consular camp he has given a description of, and its perimeter one half greater. This, indeed, is manifest, since two equal squares joined together form a rectangle, of which the area is double that of either, and the perimeter is to that of each of them, in the ratio of 6 to 4 or of 3 to 2. The Romans, he adds, always observed this method or disposition as often as both consuls had their camps joined together, and that as often as they had separate and distinct camps, the arrangement continued the same, with this variation only, that they then placed the forum, quæstorium, and prætorium, in the middle between both the armies.

Polybius, in describing the Roman method of encamping, makes no mention of the *velites*, or light-armed troops, who, in every legion, were equal in number to the *hastati*, or to the *principes*. But in giving an account of the composition of the legion, and the mode of forming it, he expressly affirms, that they were distributed equally, or in just proportion, among all the rest, according to their number. It is, therefore, natural to suppose, that the same distribution of them existed in the camp, or that two-fifths of them encamped with the *hastati*, two-fifths with the *principes*, and one-fifth with the *triarii*.

From what has been observed, then, it appears that the

Romans in the time of Polybius, allowed ground for encamping on at the rate of $59\frac{1}{4}$ square feet to every foot soldier, and $333\frac{1}{3}$, for every horseman and trooper and his horse. For as the *hastati* and *principes* were equal in number in every legion, and the *velites* equal to each of them, and as each of the former consisted of ten companies, amounting, when the establishment of the legion was at 4200 foot, to 1200, and had two-fifths of this number, or 480 of the *velites* distributed among them, it is evident, that on every spot of ground 100 feet square, occupied by a maniple either of *hastati* or of the *principes*, there were encamped 120 of themselves, and two-fifths of this number, or 48 of the *velites*, in all 168 men. But a square, of which the side is equal to 100 feet, contains 10,000 square feet, which divided by 168, gives 59 square feet, and eleven twenty-one parts of a square foot. In like manner, as the number of the *triarii* was only equal to half that of either the *hastati* or the *principes*, amounting to no more than 600 men, and as these were also divided into ten companies, and had one-fifth part or 240 of the *velites* distributed among them, it is manifest, that on each of the ten rectangles, occupied by their maniples, there were encamped 60 of themselves, and 24 of the *velites*, or 84 men. But a rectangle 100 feet long and 50 feet broad, contains 5000 square feet, which divided by 84 gives likewise 59 square feet and eleven twenty one parts of a square foot.

We arrive at the same conclusion by dividing the number of square feet contained in the whole ground assigned by Polybius for encamping all the foot of a legion, by 4200, the number of them. For the *hastati* and *principes* encamped on 20 equal squares, of which each contained 10,000 square feet, having its side equal to one hundred feet. The whole 20 then, of course, contained 200,000 square feet. If to this number of square feet there be added the contents of the ten equal rectangles of 5000 square feet each, that were occupied by the ten maniples of *triarii* and their proportion of *velites*, or 50,000 square feet, we get 250,000 square feet for the surface of the whole ground, that the infantry of one legion encamped on, which number of square feet divided by 4200 give 59 square feet, and eleven twenty-one parts of a square foot as before.

And as there were 300 horse then in each legion, who were also divided into ten parts or troops, and encamped on ten equal squares of 10,000 square feet each, it is no less evident that the encamping ground allowed for them was at the rate of 333 square feet, and one third part of a square foot for each horseman or trooper and his horse, since 10,000 divided by 30, or 100,000 divided by 300, give, 333 and one third.

Polybius also informs us that the excavation of the ditch and the raising of the rampart along the two transverse sides of the intrenchment, or those near the wings of the allies, were done by them, and that the other two sides were left to the Romans, to each legion one; that each side was divided into as many parts or portions as there were maniples to labour on it, and a centurion appointed to superintend the execution of the work in each part, and that the whole side was inspected and approved of by two of the tribunes, whose turn of duty it was to attend to every kind of necessary service in and about the camp. For the tribunes, two by two in rotation, took upon them not only the care of the camp, but the management and direction of every thing done in it for two months at a time.

As in encamping, a place was fixed for the consul's or general's tent before ground was laid out for any others, so on breaking up the camp, his tent and those of the tribunes were

were always first taken down. And when they were all struck, the baggage collected and placed on the beasts of burthen, the whole camp on a signal made began to move, with the extraordinaries usually in the van, and next to them the allies of the right wing, followed by the baggage of both. Next to them marched the first of the Roman legions with its baggage behind it; then followed the second legion, having behind it not only its own baggage, but also that of the allies of the left wing, who closed the rear of the whole march.

Polybius in his description of a consular camp has not given us any dimensions for the rampart and the ditch. These must have varied with circumstances and situations, and particularly with the length of time for which it was intended to be occupied. Julius Cæsar in the second book of his war in Gaul, chap. v. informs us that he ordered one of his camps to be secured with a rampart 12 feet high, and a ditch 18 feet deep.

In describing the Roman camp, Polybius does not give us either the names or number of the gates. He only informs us, that the exterior sides of the camp were guarded at night by the velites, who placed ten of their number at every gate, and kept watch also in the day-time throughout the whole extent of the intrenchment. It is well understood, however, from the information left us by other historians, that there were four principal gates, viz. one in the middle of the front of the intrenchment opposite to the termination of the street of fifty feet wide between the cavalry of the Roman legions, another directly opposite to it in the middle of the rear of the intrenchment, and two directly opposite to each other, and to the ends of the street of 100 feet wide between the tents of the tribunes and the Roman legions in the transverse sides of the intrenchment. That one of the two last mentioned, which was on the right hand side of the camp, was called *porta principalis dextra*, and the other on the left hand side, *porta principalis sinistra*. The other two principal gates, namely the two first mentioned, were called *porta prætoria* and *porta decumana*. But in regard to their real or actual situations, though all writers on the subject allow them to have been opposite to each other, doubts and different opinions have arisen, some placing the decuman gate in the front side of the intrenchment and others in the rear. Those, who contend for its having been placed in the middle of the rear side of the intrenchment, make it derive its name from this circumstance, that such of the soldiers, as had been found guilty of neglect of duty or delinquency, were conducted through it to the place appointed for their punishment or execution, and refer to the following words of Vegetius, book i. chap. 23, "*Porta autem, quæ appellatur prætoria, aut orientem spectare debet, aut illum locum, qui hostes respicit; aut si iter agitur, illam partem debet attendere, ad quam est profecturus exercitus, intra quam primæ centuriæ, hoc est, cohortes papiliones tendunt, et dracones et signa constituunt. Decumana autem porta, quæ appellatur, post prætoriam est, per quam delinquentes milites educuntur ad poenam.*"

The late major general Roy referring to this passage expresses himself in these words: "With regard to the decuman gate mentioned in this passage of Vegetius, it is to be observed, that for the maintenance of that rigorous discipline established in the Roman armies, when a particular corps or any number of soldiers had misbehaved in the field, or had been mutinous to their officers, it became necessary to decimate the delinquents, every tenth man being drawn out by lot and doomed to suffer death. Hence we may judge, that the decuman gate had its name from those, who had received sentence, being led out by it for punishment or

execution." Military Antiquities of the Romans in Britain, page 50.

It does not follow, however, from the foregoing words of Vegetius, that delinquents were led out through the gate in the rear of the camp to receive punishment. It may just as well be inferred from them that they were carried out through the gate in the front of the camp. And from his observing that the prætorian gate ought to look either towards the east or the enemy, we cannot exactly ascertain whether it was customary for the Romans to make the front or rear of their camp look towards the east. But this inference may reasonably enough be drawn from them that the prætorian gate sometimes looked towards the enemy and sometimes not. Polybius, without making the four different aspects of his consular camp have any reference whatsoever to the east, west, north, and south, expressly supposes the front of it to look towards those parts, that were most convenient for supplies of water and forage. If any one of the principal gates in his time went by the name of *porta decumana*, it was probably so called from the *decumani manipuli*, and *decumanæ turmæ* next to the front of the intrenchment. That it took its name from soldiers selected by decimation for punishment, being led through it out of the camp, is a supposition directly contrary to his authority; for he informs us, when speaking of that punishment and the rigour of the Roman discipline, that it was actually inflicted within the camp.

Lipius, whom most of the modern writers on the Roman castrametation as delivered by Polybius have followed, though a man of great learning, departs from some of the rules laid down by that historian. He leaves out the space fifty feet wide between the ground, that was occupied by the tents of the tribunes, and the forum, prætorium, and quæstorium, which Polybius expressly assigns for their horses, beasts of burthen, and other equipages, in these words, *ἵπποις ἅμα δ' υποζυγίοις καὶ τῇ λοιπῇ τῶν χειμερίων ἀποσκευῇ τοῖσι*. Now that their tents were not only in front of this space, but also at some little distance from it, is evident from another passage in this history, where he informs us, that three companies were allotted to each tribune, who, among other services they performed for him, furnished him always with a double guard, consisting of four soldiers, two of whom were stationed before his tent, and the other two behind it near to the horses.

He allows, however, 50 feet in depth as we have done, for the tribunes' quarters; and this depth does not appear to be more than what was necessary for them, exclusive of the 50 feet allowed for their horses, beasts of burthen, &c. as they were the officers next in rank and dignity to the consul and quæstor, had, two by two in succession, charge of the whole camp, and the superintendence of every thing done in it, and had also all delinquents brought before them to be tried and to receive sentence.

Although he leaves out the aforesaid width of 50 feet left for the horses, &c. of the tribunes, he quarters among the guards a number of volunteers, so greatly exceeding that which usually attended one consul, with two legions and the ordinary complement of allies, that he makes his camp 33 feet longer from front to rear than it is broad, contrary to the rule for keeping it always an equilateral quadrangle. In this particular, then, he departs not less than 83 feet from the rules laid down by Polybius, and makes the ground for quartering or encamping the extraordinarii in the rear deeper by the same number of feet than by these rules it could be.

Instead of making the quarters of the guards for the consul and quæstor commence, according to Polybius, from the last

last tents of the tribunes, or from the quæstorium and forum, which extended on the right and left of the prætorium towards the transverse sides of the camp as far as the encamping ground of the tribunes, and that of the Roman legions did, he makes them begin 20 feet distant from the same.

Though Polybius neither mentions the præfecti of the allies, nor assigns any encamping ground for them, it is natural to suppose, that their quarters, like those of the tribunes, extended the whole breadth of their own horse and foot, and no farther, leaving a passage 50 feet wide between the last tent of the tribunes and the first of theirs, both on the right and left, which passages must have been very convenient as communications with the principia for the horse guards, who fronted the forum and quæstorium. Lippius, however, makes the tents of the præfecti extend 29 feet into each of these openings, beyond the encamping ground of their own troops.

He also takes up ground for the quæstor and two legati exclusive of that for the public, which he has no authority for from Polybius, who makes no mention at all in his account of the Roman castrametation of a legatus or legati.

As to the duke of Rohan's plan of a Roman camp, he leaves out with Lippius the space across it 50 feet wide, expressly allowed by Polybius for the horses, beasts of burthen, baggage, &c. of the tribunes. He makes the ground for quartering the supernumeraries, strangers, and part of the extraordinary, too deep by 50 feet, which additional depth being equal to the width of the said space left out behind the tribunes' tents, causes his plan to be a square, though in his distribution of these quarters, he entirely mistakes that historian's meaning. He also lays out the quæstorium in various whimsical divisions without the least shadow of authority from that writer.

Sir Henry Saville, in his view of the military affairs of the Romans, gives a description of their consular camp, which he makes a square or equilateral quadrangle, but 32 feet broader and deeper than it ought to be, by allowing the horse of the allies 16 feet more depth on each side than their just proportion. He, in like manner, leaves out the space 50 feet wide allowed to the tribunes for their horses, beasts of burthen, and baggage; but makes the encamping ground for the extraordinary that remain after those selected for the guards are taken from them, and for strangers and supernumerary allies, too deep by 82 feet, which being equal to the 50 and 32 feet just mentioned, constitutes the Roman camp as described by him a square, of which the side, however, is 30 feet longer than it ought to be according to Polybius. He also makes the quæstorium and forum too large, and the quarters of the guards too small. He likewise gives the encamping ground of the præfecti of the allies an extent of 50 feet more than that which their own horse and foot cover.

The late major-general Roy has professedly given us a plan and description of a consular camp, and also a plan of a Roman camp, when both consuls encamped together, or within the same intrenchment, in his military antiquities of the Romans in North Britain, published after his death in one volume in folio by the Royal Society of Antiquaries in 1793. But not being acquainted with the Greek language, he took the accuracy of Mr. Hampton's translation of Polybius for granted, as he himself informs us, supposed with him the cavalry of the allies to have been triple that of the Romans, and on that erroneous supposition has grounded all his computations respecting their castrametation, and particularly in comparing the Polybian camp with those in Scotland, that were first discovered by the learned, ingeni-

ous, and very able military antiquarian, general Melville, in 1754, who manifested a very fine and superior degree of discrimination in concluding from Tacitus's narrative, and the reasons of war, that Agricola must have crossed the Tay above Perth, and proceeded along Strathmore, and that there were certainly some remains of his camps still to be found in that vale, in opposition to the opinion of the engineers, who were then employed by government on a survey of that country, and the persevering assertions of one of them in particular, who had actually surveyed the situations, on which they were afterwards discovered by general, then captain, Melville, without knowing what they were. General Roy received from captain Melville, who was about to leave this country and repair to the West Indies, a communication of that discovery, and first learnt from him, as he himself acknowledges, what was really meant by a temporary Roman camp, which information excited his curiosity, and led him to turn his attention to the subject of Roman military antiquities in Great Britain. But though he prosecuted it occasionally for a number of years with a very laudable degree of zeal and industry, it must be allowed, that he committed several material and great mistakes in his plan and description of the Polybian consular camp.

He leaves out the space fifty feet wide behind the tents of the tribunes, expressly allotted by Polybius for their horses, &c. He does not make the extent of the tribunes encamping-ground transversely across the camp, so great as that of the Roman horse and foot, by about one hundred and fifty feet, leaving a distance of about two hundred feet between their first tents on the right and left; whereas Polybius tells us, that the one was equal to the other. His words are these: *αφεξῆς δ' αλληλων μεν ἴσον αἱ των χιλιάρχων σκηναί, τοσούτοι δὲ τόπον ὅσος πᾶσι ὅλοι το πλᾶτος αἰ των Ρωμαϊκων στρατοπέδων παράκειν.*

He leaves an open place or street of twenty five feet wide on the left of the prætorium, between it and the forum; then sets off a rectangular space of the same depth with the prætorium, and about one hundred and thirty feet wide, which he divides equally into two parts, the one next to the tents of the tribunes as quarters for the legati, and the other immediately behind that for the market-place, or forum; then leaves another street of twenty five feet wide; and on the remainder of the ground set apart by Polybius for the forum, extending as far as that occupied by the last tent of the tribunes on the left he encamps one half of the ablest, or select horse of the allies for the consul's guard. He then leaves a street fifty feet wide, making that between the hastati and horse of the allies on the left extend quite to the rear of the camp, then encamps half the evocati and volunteer horse looking toward the prætorium, and close behind them, with their backs to theirs, half the evocati, or volunteer foot; then leaves another street of twenty-five feet, and beyond that encamps half the select foot of the allies for the consul's guard. On the right of the prætorium, he in like manner leaves a street twenty five feet wide, then sets off a rectangular space as deep as the prætorium, and about one hundred and thirty feet broad for the quæstor's quarters, and for the cloathing, arms, and provisions behind them; then leaves another street twenty five feet wide; then encamps the other half of the ablest, or select horse of the allies for the consul's guard; and so on as on the left. In making all these streets, divisions, allotments, and allocations, he is so far from being sanctioned by Polybius, that they are in direct repugnance and contradiction to that author's authority, who makes no mention at all of legati, but allows about five times as much ground for the forum, and about twice and a half as much for the quæstorium as he does.

On each side of the street fifty feet wide, leading to the rear from that of one hundred feet in width behind the prætorium, he allots a rectangular space of four hundred feet by one hundred and twenty five for the extraordinary horse of the allies facing the said broad street, and an equal space on each side for the extraordinary foot of the allies immediately behind them and facing the rampart; then leaves on each side a street fifty feet wide, and lastly makes two rectangular locations of four hundred feet by two hundred and fifty each for strangers coming to the camp, thus preposterously allowing for occasional comers, as much ground as he allots for the encampment of all the hastati and principes, with four fifths of the velites of a complete Roman legion. The truth indeed is this: he makes the depth of the encamping ground in the rear of the prætorium one hundred and eighty three feet, and one third of a foot greater than it ought to be by Polybius's account of the Roman castrametation. And his camp taken altogether differs widely and essentially from the one described by that author. For he makes each side of the encampment one hundred and thirty three feet, and one third of a foot longer than it should be, and each side of the intrenchment also of course. Of this, he seems to have been partly aware himself; for in page 45 of his work, when he uses in the text these words, "therefore the side of the square of intrenchment of a consular army was two thousand one hundred and fifty Roman feet," he in a note expresses himself in the following: "If according to Lipsius and others, who have copied from him, there had only been in the consular camp twice the number of *allied foot* (he must unquestionably have meant to say *allied horse*) that there was of Roman horse, then the space actually occupied by the troops would have been a square of sixteen hundred and sixteen Roman feet, and two thirds of a foot." It is much to be regretted that there are many palpable errors and mistakes in that elaborate, and in many respects valuable performance, which might have easily been avoided by a little proper attention to the printing of it. They are so numerous indeed, that we cannot allow ourselves to regard it as a correct copy of the manuscript, he left behind him.

The square was the most convenient and best figure the Romans could have adopted for their encampments. Of all right-angled quadrilateral figures of the same perimeter, its area is a maximum, or the greatest. It therefore required less extent of intrenchment than a rectangle of the same area or superficial contents. And if we examine the disposition or arrangement of the various locations they made within it for their troops, taking into consideration at the same time the invariable simplicity and regularity of their method of encamping, we shall find, that there neither was any ground lost nor any wanted to render it more commodious, and he apt to regard it as the best perhaps, that could have been contrived before the invention of gunpowder, and the use of fire-arms, which have made great and essential alterations necessary.

Even in modern encampments, however, so much of the Roman method is still retained by all nations, that in encamping their troops, they constantly place the privates in the front, behind them the subalterns, then the captains, and in the rear of these the field-officers. And Frederick the Great, king of Prussia, tells us, that it was his custom, in imitation of the Romans, to enclose his camps with intrenchments, which, besides answering other good purposes, contributed greatly to prevent desertion.

We shall now proceed to give an account of modern castrametation, which is also regulated, in a great measure, by certain rules, that are liable, however, to be altered and

varied in different situations and positions, so as to occupy the ground to the best advantage, and most commodiously for the free and useful operations of the different descriptions of troops, according to the opinion and judgment of the general, or officer commanding them.

Camps take different names, or denominations, from the objects those have in view who form them; such as for instance:

Camps offensive,	A camp for forage,
Camps defensive,	A camp of observation,
A camp of rendezvous,	A covering camp,
A camp of passage,	An entrenched or retrenched camp.
A camp of rest or repose,	An entrenched or retrenched camp in a campaign, or open country.
A fixed or standing camp,	
A flying camp,	
A camp of peace and exercise,	

Camps offensive, or camps for the attack, interruption, and annoyance of an enemy.

The principal objects which every general either has, or ought to have in view when he chooses ground for a camp, are of two kinds, the one offensive, and the other defensive. The camp in which an army assembles, at the beginning of a war or the opening of a campaign, is of the first class or description. In such camps, attention ought chiefly to be paid to the convenience of the troops, who should encamp in small separate corps near their magazines, or depots, in such a manner, as to be able to unite in a short time. And as such camps are generally at some distance from the enemy, there is little or no danger to be apprehended from making the convenience and accommodation of the troops the first object of attention.

The most essential properties of every camp are health, fulness, and security. These are advantages which ought to be attended to and fought after on all occasions. But an attention to wholesomeness is still more necessary in one that is to be occupied for a considerable length of time, than in another, where troops are to make but a short stay. Low, wet, damp, and marshy places should be avoided in every country; and in hot climates, situations that are much exposed to the burning heat of the sun. On the other hand, rising grounds with an eastern aspect, commodiously situated for pasture, and for supplies of water, forage, and fuel, ought to be preferred to other situations for encampments.

A general ought to be a good judge of situations himself, and to choose his own camps. His knowledge should not, as is sometimes the case, be confined to the mere rudiments of the art of war, or to the siddle saddle business of parades, reviews, and sham fights, that have no resemblance whatever to real actions. He should be able to discern at sight, or to discover with a glance of his eye, all the possible advantages, as it were, which any post or position is capable of affording, and to improve this talent in practice, by the principles of fortification, which are the basis, or ground-work of it, and which he ought to carry with him into the field, and apply to every situation of his army, availing himself of heights, defiles, rivers, rivulets, morasses, inundations, woods, &c. When master of the rules of that science, he can also apply it successfully for finding out the weakness of the enemy's position and order of battle.

A *camp offensive*, or of offence, is formed for the purpose of annoying an enemy in various ways, such for instance, as to force him to raise a siege by cutting off, or straightening his intercourse with the adjacent parts of the country and his own depots; to compel him to quit an advantageous position by either attacking it at last if necessary, or by investing one of his towns or places; to make incursions

sions into some one or other of his provinces; to intercept his convoys; to embarrass his communications; to consume the forage he might draw benefit and advantage from; &c.

As security is always one of the first objects of consideration, every camp, of whatever species or description it may be, ought to have its front and flanks placed entirely out of the reach of insult. In any situation, therefore, that is chosen or fixed on for a camp, (and there are various ways of occupying the same ground) care should be taken not to extend either flank towards the enemy, or to expose it to commanding ground within cannon-shot, that he may have it in his power to occupy or possess himself of, but to place it in such a manner as to make it afford support to both wings of the army. It ought to be guarded and secured both in front and rear by detachments: and particular attention should be paid to its lying commodiously for pasture, forage, water, and wood, which is not only useful as fuel, but for pickets, palisades, and other purposes. It should also be conveniently situate for the army that occupies it, to move out of it either to form in order of battle, or to abandon it altogether without being exposed to much molestation from the enemy, who, did he command the principal avenues or approaches to it, would have it in his power to shut them up, and thereby force them either to surrender, or to attack and fight him on very disadvantageous terms. There are many situations that appear to be very strong, and naturally are so, which, from this very circumstance of troops not being able to quit them when necessary without exposing themselves, are in reality both weak and dangerous. And an unskilful general may be led by the mere appearance of them into great mistakes, and thereby, not only draw disgrace on himself and his troops, but also plunge his country into the most disastrous calamities. But a knowledge of fortification will enable a commander of naturally good talents to choose heights, and occupy them in such a manner, as to prevent their being commanded by others; to cover his flanks effectually, so as to secure each post as to render it capable of defence, and to avoid those, in which a gallant officer cannot maintain his ground, without running the risk of losing his reputation.

Camps defensive, or camps of defence. Such camps are strong by their situations chiefly, and have no other design than that of preventing attacks. Every situation that has its front and flanks equally strong, and is free and open behind, is proper for this sort of camps. There are heights that have a front of a certain extent, and their flanks covered by morasses, and positions, that are secured in front by a river or marshy rivulet, and their flanks by ponds. Such camps having no other object than to prevent their being attacked by the enemy, great care should be taken not to fix on false points of support. For this purpose, the rivers and marshes in their front, and on their flanks, ought to be founded in order to ascertain whether the rivers are not fordable, and the marshes impracticable.

When such a camp has a river in its front, it should not be placed nearer to the bank thereof than eight hundred or a thousand paces, in order to leave ground sufficient for drawing up the army in order of battle.

Positions taken under the protection of towns or places, are defensive camps.

When the object of a defensive camp is to cover a country, the principal attention of a general in choosing it ought to be directed to those points, which the enemy has it in his power to attack, and by which he might penetrate.

Camp of rendezvous. When at the commencement of a war, or the opening of a campaign, an army is brought together in the field, either in one entire body, or in a sepa-

rate corps, or parties, at no great distance from one another, it is said to be in a camp of rendezvous. Such a camp is either more or less out of the reach of the enemy, and in the first of these cases the convenience of the troops ought to be the first object of attention. It is also sometimes intended to be offensive, and sometimes defensive. When it is formed for the purpose of offensive operations the following maxims ought to be observed:

To avoid extending either flank towards the enemy, or exposing it to ground that he can take possession of; to choose a position for it strong by nature; to support well the wings; and to secure it against surprise or any sudden assault by detachments, both in front of, and behind it.

To proportion its extent to the strength of the army.

If you are in an open and level country, to encamp your army in order of battle, and if you cannot secure your camp against insult or surprise by detachments, to throw up intrenchments sufficient to prevent your being obliged to fight contrary to your intention or inclination, or when it is not necessary for you to come to action.

In a broken or uneven country, to separate your army without encamping the different corps at too great a distance from one another, occupying the highways, villages, &c. in your front.

In a mountainous country, to encamp your troops according to the situation and nature of the ground, but in such a manner that the most advanced corps may receive prompt aid and support from the rest.

Not to place your cavalry on either wing when it is near a wood, village, or other place, into which the enemy can throw in some of his infantry; but sometimes to place them all on one wing, and sometimes to encamp them in a second line, or otherwise, as the ground and circumstances may point out.

When the enemy is on the opposite side of a river, rivulet, morass, &c. to encamp at a sufficient distance from it to prevent your being incommoded by his fire, in even forming your army in order of battle in front of your own camp.

To reconnoitre the highways, rivers, rising grounds, rivulets, ferries, castles, woods, and other places in the neighbourhood of your camp; and to keep open a communication between its rear and several roads, for the purpose of receiving supplies of provisions, &c.

To choose your camp in such a manner, that the enemy, by moving on his right or left, may not oblige you to quit your position, but on the contrary, that by making a short or small movement yourself you may compel him to make a long or circuitous one, and to quit his position or leave the country.

This is the surest criterion by which one can judge of the skilful or unskilful choice of a camp.

And, in short, though you are acting offensively, to take every possible precaution for the security of your camp when the enemy is near you, and by no means to despise him. For negligence and contempt of an enemy tend always to render him bold and enterprising.

When defensive operations are the object of a camp of rendezvous, it is necessary to observe, besides these, the following maxims:—

To avoid encamping in a plain or level country.

To attend particularly to the extent of the ground you occupy, and to the number and nature of the troops your army is composed of.

Always to entrench your camp, taking care that no part of it can be entailed.

To occupy the bridges and fords of rivers, &c. and if you are

are apprehensive of suffering by inundations, to make dikes to turn the course of the water.

To avoid placing either of your wings behind a morass, or any thing else, that may be an obstacle to its manœuvring easily, and co-operating with the rest of your army in case of an attack.

To place your artillery on heights, and dispose of it in situations from which it can do most execution.

And to keep open a free and convenient egress from it in the rear, that your retreat may not be cut off.

A camp of passage. In an offensive war troops encamp transiently, when they march either to attack an enemy, or to dislodge or force him from a post, by different manœuvres; or to get before him to some passage, and penetrate into his country; or to invest a place, and form the siege of it; or, in short, to join an advanced corps or army.

In a defensive, as well as an offensive war, they occupy a camp of passage when they take post to cover their country; when they are obliged to regulate their movements by those of their enemy; when their object is to effect some junction; or, finally, when they are constrained to abandon a post, a frontier, or even one part of their country to cover another.

A camp of rest or repose, is that in which troops either wait for forage, or watch the enemy's motions, in order to regulate theirs by his, or in which they are allowed to remain for some time stationary on account of sickness or some other cause. As repose is the sole object in such a camp, it should have such a river or morass in its front as renders it inaccessible. And if the river, rivulet, or morass in front of it has not a sufficient depth of water it should be dammed up so as to be impassable.

Such a camp should not only have its front naturally strong, but also have a site or situation that is elevated and healthy; and when it is of a permanent nature, it should have abundance of water, wood, forage, and provisions, within its reach and command, and should cover the road or route of all its convoys.

A fixed or stable camp may have different objects, according as an army acts offensively or defensively.

When it is on the offensive, it occupies such a camp for a certain time, to form the siege or blockade of a place; to wait the effect of a diversion or the capture of a place, which a detached corps has been sent to attack; to give a reinforcement or convoy time to arrive; to consume or destroy, during the course, or towards the end of a campaign, the forage or subsistence of a country, which they design to abandon; to give rest or repose to an army after a long march or operation that may have caused a loss of men, or occasioned diseases, or, in fine, during the course of a campaign, that has not been so prosperous or fortunate as was at first expected.

When a general encamps before a place to attack it, which he knows the enemy cannot assemble a sufficient force to attempt the relief of, and when he has little to fear from any detachments he may send out, either for that purpose or to interrupt the operations of the siege, he has then only to distribute his troops round the place as commodiously as he can, seizing on commanding grounds and other advantageous objects, and taking care to have his circumvallation as near to it as possible, provided he is just out of the reach of annoyance from the besieged's shot and shells.

When he is on the defensive, he chooses a stable camp to cover his country, or some place of importance, that the enemy designs to besiege. Besides these two objects, a stable camp has several others, which are common to it with camps of other denominations. There is one, however, which it may not be improper to mention, which is this; that a general can remain in it till he sees his enemy sepa-

rate his forces, and send them into winter quarters, in order that he may go into his own without dread of inquietude or molestation.

A flying camp denotes a corps or body of troops consisting of three, four, five, six, &c. thousand men, infantry and cavalry, that has power to encamp and decamp at the pleasure of the general or officer commanding it, as necessity and circumstances may require, that is continually in the field, and is constantly making divers movements to harass the enemy, stop his incursions, check and render abortive his enterprises, intercept his convoys, tease and fatigue the neighbouring country, and to throw itself, in case of need, into a besieged place, that is in want of succour or assistance.

Though there is some difference between the command of a flying camp and a large army, the resemblance, however, is so great, that a general officer, who has often commanded a detached or separate body of troops is, *ceteris paribus*, fitter for the command of a large army than one who has not enjoyed that advantage.

A general officer, therefore, who is ambitious of preferment, anxiously endeavours to procure for himself such commands and to qualify himself for them.

A flying camp occasions much uneasiness and inquietude to an enemy, by hovering on his wings. It is destined to cover some tract of country between two armies; to make head against some similar corps, that the enemy has formed or detached; to undertake and execute some particular enterprises; to throw troops into some place that is menaced or threatened; to draw contributions from certain districts, and to regulate its movements at the same time, in such a manner as always to have it in its power to join the main army after a march of one or two days at most, in order that, if a favourable opportunity for a general engagement should present itself, it may arrive in time to take a share in it.

The general, who commands a flying camp, ought to be extremely attentive and vigilant, to have his troops highly disciplined, to suffer no straggling or dispersion of them, to march with great precaution, to choose advantageous camps, and to regulate his movements in such a manner as to be always in readiness to surprise his enemy when it is possible, without running the risk of being surprised himself. He should be alert against all sorts of enterprises on the part of the enemy. He ought to have parties always on the look out, and to relieve them; and he should not be sparing in the employment of spies, of whom he may have enough if he only pays them well. Money can seldom be more usefully employed.

A camp of peace and exercise, is a camp destined for the exercise of all the military duties and functions.

In such peaceable encampments the troops should be trained up and instructed in every sort of fatigue, labour, and duty, which is necessary on actual service, for rendering warfare successful. In such a situation an active and able general will not only have them practised in throwing up works expeditiously, but will also turn a great part of his attention to their discipline. He will make them encamp in order of battle, and cause every part and branch of the service to be performed with as minute accuracy, and as punctual an observance of orders, as if they were in the field, or in the face of an enemy. He will examine whether the officers on guard are sufficiently vigilant and acquainted with every particular of their duty, and whether the guards themselves are posted according to orders. He will not only have the infantry exercised frequently, but the cavalry also, when they are not employed in foraging, and

the recruits of both daily. He will inspect and look at the horses himself, praising those officers, who have been careful of them, and severely reprimanding those who have neglected to have them taken care of. In short, he will by his vigilance and attention, in making every part of his army perform its duty with punctuality and exactness, give activity, skill, and animation to the whole, and prepare them for acting with vigour, advantage, and success against an enemy.

A camp of forage, or for foraging. Such camps are sometimes at a distance from and sometimes near to the enemy. In the first case, neither your camps nor foraging parties are in danger of molestation or insult. There are certain precautions, however, that ought never to be neglected, even when you have nothing to apprehend from any attempts of the enemy. Your camps therefore ought, in either case, to be strong by nature, or rendered so by art, and particularly in the last, when you are near to an enemy. Besides, a strong camp enables you to send out stronger foraging detachments than you could otherwise venture to do; and on this service it is sometimes necessary to employ a great part of your army. Foraging is certainly an essential part of the art of war; and parties of foragers may very justly be considered as detachments sent out against the enemy. A rich and fertile tract or district of country should be chosen for it, and secrecy ought to be observed in regard to the time when, and the place where, you intend to forage. Your orders respecting this service should not be communicated even to the officer, who is to command the troops employed on it, till late in the evening before it is to be performed. You ought, on such occasions, to detach a number of small parties to acquire an exact knowledge of the enemy's motions. And, if you are on your guard against stratagems, it will be safer for you to forage when he does than at other times.

A camp of observation is the camp of an army employed in watching the motions and operations of an enemy, in harassing and perplexing him, and preventing him from penetrating in a country or tract of territory, to surprise or take an important place, or to molest another army, and force it to abandon its preconcerted enterprises and designs. An army of observation, during a siege, is almost always in motion and on the look out, occupies the avenues or approaches by which the enemy can present himself, follows him in his movements, keeping parallel to him, but constantly between him and the besieging army, in the most advantageous manner it can, to avoid being obliged to fight contrary to its inclination, and sometimes seizes on a commanding post, and there entrenches itself, when its camp may be called.

A covering camp, which appellation is given both to such an encampment for covering a siege, and to positions chosen for camps that are designed to cover a country or district. In choosing one for the last of these objects it is not necessary to pay so much attention to the natural strength of the place itself as to the parts or passes, through which the enemy may or must attempt to penetrate, if he expects to penetrate at all. These should be occupied and secured by your army, in those places where they are most easily defended, and where he cannot attack you without great hazard and danger. By acting judiciously in this manner you will, with very inconsiderable movements on your part, oblige him to take long and circuitous routes, and thereby harass his troops without being able to carry on any solid operations.

An intrenched or retrenched camp. Such a camp is sometimes made during a campaign on the field, sometimes before a place, and sometimes under a place.

The ancients, and particularly the Romans, did not remain, even for an inconsiderable length of time, in any place without fortifying it. Their intrenchments did not hinder them from marching against the enemy when it was thought proper; but they put their armies out of the reach of insult, particularly when they were composed of new levies or of raw and unexperienced troops, furnished places of security for their baggage and provisions, and enabled them to send out large foraging detachments without exposing their camps to insult.

It is not sufficient, when one is on the defensive, to have your camp on a situation naturally strong. It is also necessary, particularly when the enemy is under the necessity of coming to attack you, to remedy and remove the smallest defects of ground or position by intrenchments, which put you completely under cover, and place you in a condition to make a vigorous and obstinate defence.

In an open or level country, it is advisable for you, in constructing your intrenchments, to avail yourself of every advantage that the ground offers, to profit by rivers, rivulets, morasses, canals, marshes, hollow ways, ditches, villages, inclosures, castles, &c. and to proportion the relative degrees of strength in your intrenchments, in different places, in such a manner as to render every part of your position equally strong.

In a woody and mountainous country, you should not only take all the precautions necessary to be observed in an open and level one, but ought also to make abattis, dikes, batardeaux, &c.

An intrenched or retrenched camp before a place, has for its object both offence and defence, when the enemy is either in sufficient strength to attempt to raise the siege, and to throw in succour and relief to the besieged, to enable them to hold out for a longer time than they otherwise would be able, or when the besieged themselves are sufficiently numerous to make strong and frequent sallies. In the first case a line of circumvallation is made to secure the besieger's army against all attempts from without; and in the second a line of contravallation is thrown up between the besieger's camp and the place, to prevent any molestation or interruption on the part of the besieged from within.

In constructing both these lines you should be particularly careful to occupy the most commanding and advantageous ground round the place, whether it be a little farther from or nearer to it than you could wish, availing yourself of heights, ravines, &c., and making use of abattis where there is wood, and every thing else from which you can derive advantage. If they are intersected by rivers, rivulets, canals, morasses, &c. you should have secure and convenient bridges and ways of communication between the different parts.

An army of observation is even of the greatest advantage at the commencement of a siege. It watches over the besieger's preservation till he firmly establishes himself, can forward his operations, escort his convoys, supply him with fascines, and perform many other sorts of labour for him. These two armies should always be within reach of each other, particularly at the beginning, that they may be able to afford mutual aid and succour to each other, and keep the enemy at a distance, who will naturally be afraid of approaching too near, if they are too powerful for him, lest they should fall upon him conjointly, and attack him with advantage.

Intrenched or retrenched camps under places, which are ascribed by some to the celebrated marshal Vauban, who recommends the forming of them at most frontier places, have defence only for their object. A camp of this sort may have one particular object only, or several objects at once.

ence. Near or under a place of importance, it serves to render the attempt to besiege it the more difficult, and to retard or hinder the taking of it. Under a place surrounded by heights, as well as one that has only a simple inclosure or bad fortifications, it becomes necessary for its defence. When there is a number of troops in a place, it is useful for assembling them in, for placing them commodiously, and for putting them in a condition to act against the enemy, as occasions may present themselves. It is a support for an army that is not strong enough to take the field, and is convenient for the inhabitants of the neighbourhood to retire to with their effects.

The depth of a regiment of infantry encamped, consisting of nine companies of 100 men each, from the serjeant's tents to the rear, used to be 200 yards, and the front 245, including the battalion-guns. A regiment of infantry of the same strength is now allowed 200 yards in front, including its two battalion guns, and 320 yards in depth.

A regiment of dragoons encamped, consisting of six troops that form three squadrons, with the light troops, used to take up 200 yards in front and 258 in depth; and the interval between two regiments of infantry or cavalry used to be 60 yards.

A squadron of horse has now a front of 120 yards; and an interval of 100 feet is allowed between each regiment.

The forming of an intrenched camp, near a town or village, is attended with many advantages. It furnishes room for establishing magazines for stores, forage, baggage, and for the sick and wounded. The houses and buildings help to cover its flanks, and thereby enable you to render it more compact than it otherwise could be made. Such a camp also covers and protects a place that has not works or fortifications sufficiently strong to resist an enemy. When the ground is favourable for the purpose, such a camp may be formed in the figure of a square, or nearly so, which will require much less extent of intrenchment than a long rectangular one, and is more defensible.

Some able generals have been for rejecting lines altogether; among which number is the celebrated marshal Saxe, who is a great advocate, however, for redoubts in front of an army, and mentions particularly the wonderful advantage they were of to Peter the Great and the Muscovites at the battle of Poltava. It must be allowed that lines and intrenchments are often thrown up on a campaign very injudiciously and to little purpose; and unless some parts of them be closed in the rear, they are totally lost the moment they are forced or carried in any one point. But such temporary lines and intrenchments for transitory camps are different from those we have just been speaking of, either before or under places.

Frederic II., king of Prussia, has proposed to form lines or retrenchments with square redoubts, placed in saliant and re-entering angles, with an angle of each outwards or towards the enemy, joining them with trenches, as in *fig. 4. Plate v. Military*, &c. He observes, that the redoubts in the saliant angles ought not to be above 600 paces distant from one another; but 600 yards are distance enough. And the ingenious general Lloyd has proposed a similar arrangement of redoubts, in front of an army drawn up in order of battle, without joining them with trenches, but leaving the intervals between them open.

Fig. 1. Plate v. is marshal Vauban's form of lines, and *figures 2. and 3.* are his first and second profiles of them.

Fig. 5. is a form for lines, with bastions and broken curtains.

CAMP, *city, castra urbana*, was a place near the city-wall not far from the *via nomentana*, where the prætorian guard were encamped; whence it was also called the *prætorian camp, castra prætoria*, or *prætoriana*. The like we also read of at Jerusalem, called by St. Luke absolutely the *camp, παρεμ-βολη*. By which we are doubtless to understand the *castra antonia*, which Josephus tells us, was afterwards used as a castle.

CAMPS, *mooned, castra lunata*, those made in figure of a half-moon.

CAMP, *naval, castra nautica*, or *navalia*, denoted a station of ships.

CAMP, *standing, castra stativa*, was that wherein they designed to continue longer in a place; and therefore more pains were taken to fortify and regulate it.

The Roman camps, in a march, were also called in the middle age *mansiones*. See CAMP, *supra*.

CAMP, *summer, castra æstiva*, among the Romans, was ordinarily light and moveable; so that they might be set up, or taken down, and removed in a night. In which case it was also called simply *castra*. See CAMP.

CAMP, *winter, castra hyberna*, or winter-quarters, were usually taken up in some city or town; or else so contrived, as to make almost a town of themselves. See CAMP.

CAMPS, *tertiated, castra tertiata*, those which were a third part longer than broad, which Hyginus represents as the Roman model. *Castra in quantum fieri potuerit tertiata esse debebant—ut puta in longum duo milia quadrigenti, in latum mille sexcenti pedes*.

CAMP is also used among the Siamese and East Indians, for a quarter of a town assigned to foreigners, wherein to carry on their commerce.

In these camps, each nation forms itself a kind of city apart, in which their store-houses and shops are, and the factors and their family reside.

The Europeans at Siam, and in most other cities of the East, are exempted from this restraint, and allowed to live in the cities and suburbs, as they find them most commodious.

CAMP *colours-men*, are soldiers appointed to attend and assist the quarter-master general, in marking out, and keeping the camp clean, receiving and distributing provisions, &c.

The camp colours-men are drawn a man out of a company, that are exempt from all other duty during the campaign: each carries either a spade or a hatchet, or a pole bearing colours.

CAMP *Diseases*, or the diseases incident to armies, are such as arise chiefly from exposure to the heat and inclemency of the weather, and from infection. Consequently they are different, according to the season of the year, and to the climate and soil of the country in which the army is engaged. The ancient maxim of Hippocrates, that "the summer and autumnal seasons are the most sickly," is confirmed by sir John Pringle, not only with regard to warm climates, but to every camp, where men are necessarily much exposed to heat and moisture, the great cause of putrid and contagious diseases. (*Obs. on Dis. of the Army, P. II. ch. i.*) The diseases of summer and autumn are, remitting and intermitting fevers, cholera, and dysentery. But the latter, though produced by heat and moisture, is propagated extensively by contagion: it declines, however, with the autumn; but the remitting fevers continue as long as the encampment, and never entirely cease till the frosts begin. In the winter, inflammatory diseases chiefly prevail, such as coughs, pleurisies, acute rheumatisms, inflammation of the brain, bowels, and other less important parts: and the consequences of these

are often consumptions, chronic coughs, and rheumatisms.

Independently of the noxious effluvia from marshes, from the privies of the camp, and the putrid straw in the tents, which spread diseases through a camp, the soldiers are often attacked with the typhous or putrid fever, when crowded together in hospitals and barracks in consequence of the confined air; hence this fever has been demoniated the *hospital* fever.

There are other causes, also, which contribute to the production of diseases in an army, partly by predisposing the body to be more easily affected by noxious agents, and partly by actually exciting disease; such are errors and irregularities in diet, the use of bad water, intemperance in spirits, the extremes of fatigue and inactivity, loss of rest, and want of cleanliness. The means of limiting the operation of these causes were suggested by Drs. Pringle, Monro, and other authors; and considerable improvements in the clothing, and means of subsistence of the men, in the ventilation of hospitals, &c. have been adopted, by which the number and mortality of camp-diseases are somewhat diminished.

CAMP duty, in its utmost extent, includes every part of the service performed by the troops during the campaign. But in a more particular sense, it denotes the duty performed by guards and detachments, for the security of the camps, and preventing surprises.

Part of the camp duty is performed in the same manner as that of a garrison.

CAMP fight, or **KAMP fight**, in *Law Writers*, denotes the trial of a cause by duel, or a legal combat of two champions in the field, for the decision of some controversy.

In the trial by camp fight, the accuser was, with the peril of his own body, to prove the accused guilty; and by offering him his glove, to challenge him to this trial, which the other must either accept of, or acknowledge himself guilty of the crime whereof he was accused.

If it were a crime deserving death, the camp fight was for life and death: if the offence deserved only imprisonment, the camp-fight was accomplished when one combatant had subdued the other, so as either to make him yield, or take him prisoner. The accused had liberty to chuse another to fight in his stead, but the accuser was obliged to perform it in his own person, and with equality of weapons.

No women were permitted to be spectators, nor men under the age of thirteen. The priest and the people, who looked on, were engaged silently in prayer, that the victory might fall on him that was right. None might cry, shriek, or give the least sign; which, in some places, was executed with so much strictness, that the executioner stood ready with an axe to cut off the right hand or foot of the party that should offend herein.

He that, being wounded, yielded himself, was at the other's mercy, either to be killed or suffered to live. But if life were granted him, he was declared infamous by the judge, and disabled from ever bearing arms, or riding on horseback. Versteg. Rest. Dec. Intell. cap. iii. p. 51. See **ACRE-fight**, **BATTLE**, **CHAMPION**, and **COMBAT**.

CAMP hospital. See **HOSPITAL**.

CAMP law, a method of deciding controversies by duel or camp-fight.

CAMP-mills, in the *Military Art*, denote portable or moveable mills, which can be used, particularly in time of war, when there are neither wind-mills nor water-mills in the neighbourhood, and which, on that account, formerly accompanied armies, in the same manner as camp-ovens and camp-forges. Some of these mills have stones for grinding

the corn, and others are constructed with a notched roller like those of our coffee-mills. Some of them are also so contrived, that the machinery is put in motion by the revolution of the wheels of the carriage, in which they are placed; and others, more commonly, are driven by horses or men, after the wheels of the carriages are sunk in the ground, or fastened in some other manner. The invention is ascribed to Pompeo Targone, engineer to the marquis Spinola, about the end of the 16th century. Others ascribe the invention to the Germans, about the year 1633. Beckmann's Hist. Invent. vol. iii. p. 160.

CAMP of Gold Cloth, in *History*, a denomination given to the scene of interview between the kings of France and England, Francis and Henry, and their respective queens, in 1519; seated between Ardres and Guines. This interview was conducted with singular magnificence and splendour; it lasted 10 or 12 days, exhausted the treasures of both monarchs, ruined many of their nobility, and terminated without answering any useful purpose.

CAMPACH, in *Geography*, a river of Carinthia, which runs into the Moll, near Velach.

CAMPÆ, in *Ancient Geography*, a town of Cappadocia, in the department of Cilicia. Ptolemy.

CAMPAGNA, in *Geography*, a town of Naples, in Principato Citra; the see of a bishop, suffragan of Conza; 16 miles E. N. E. from Salerno, and 13 S. S. W. from Conza.

CAMPAGNA di Roma, formerly *Campania*, a province of Italy, in the state of the church, comprehending the greater part of ancient Latium, and bounded on the north by the river Sabina, on the east and south-east by Abruzzo Ultra and Lavoro, on the south-west by the Mediterranean, and on the north-west by the Patrimony of St. Peter. It is about 60 miles long on the Mediterranean sea, and 33 broad. The country contains many beautiful plains, and the soil is fertile; but a great part of it is insalubrious on account of the Pontine marshes, so that there are few towns or villages, and the inhabitants are poor. Several attempts have been made to drain these marshes, and they are now traversed by a firm road. By these means, and some internal regulations in favour of the husbandmen, the insalubrity of the air is likely to be corrected, and the population and fertility of the province increased. The unwholesomeness of the climate in this province is said to have commenced after the invasion of the Goths in the 5th and 6th centuries; and to have been owing to the accumulated ruins of the edifices of Rome, which raised the bed of the Tiber, and caused its waters to stagnate and to overflow. The exhalations proceeding from such a mass of stagnated waters, contributed very much to infect the air of this hot climate. This evil, resulting from the same cause, was aggravated as long as Rome was exposed to the incursions and devastations of the Lombards, the Normans, and the Saracens, which lasted for several centuries. At the beginning of the 13th century, the air was become so infectious, that Pope Innocent III. says, that few people at Rome attained to the age of 40 years, and that it was very uncommon to see a person of 60. When the papal see was transferred to Avignon, and during the 72 years of its continuance there, Rome became a desert. Its monasteries were converted into stables; and Gregory XI. on his return to Rome in 1376, could scarcely count in it 30,000 inhabitants. His death was succeeded by the western schism, which continued upwards of 50 years; and when this schism terminated in 1492, Martin V. and those who immediately succeeded him, were able to make but feeble efforts against so inveterate an evil. It was not till the commencement of the

the 16th century, that Leo X. vigorously attempted to restore the salubrity of the air; but the two sieges of Charles V. plunged it again into its old calamities; and the number of inhabitants, which in the time of Leo X. amounted to 85,000, was reduced under Clement VIII. to 32,000. Since the time of Pius V. and Sixtus V. towards the close of the 16th century, the popes have been assiduous in their endeavours to purify the air of Rome and its environs, by procuring proper discharges for the waters, drying up the moist and marshy grounds, and covering the banks of the Tiber and other places that were deemed uninhabitable with superb edifices. Since that time a person may dwell at Rome, and go in or out of it, at all seasons of the year. But at the beginning of the last century, they never ventured to sleep at Rome, even in the day, in any other house beside their own. But these scruples, says M. Condamine, have of late very much subsided; and he says, that he has seen cardinals, in the months of July and August, go from Rome to lie at Frascati, Tivoli, Albano, &c. and then return the next or the following days to the city without any detriment to their health; and he adds, that he has himself tried all these experiments, without the least inconvenience. "We have even seen," he says, "in the last war in Italy, two armies encamped under the walls of Rome, at the time when the heats were the most violent. Nevertheless, the country people in general dare not still venture to lie, during that season of the year, nor even so much as sleep in a carriage, in any part of the territory comprehended under the name of the Campagna of Rome." The amphitheatre of hills that bound the Campagna on one side is crowned with towns, villages, and villas, which form very delightful landscapes. The ancient Romans were accustomed to seek shelter from the scorching heats of summer among the woods and lakes of those hills; and the cardinals and Roman princes, at the same season, retire to their villas; while many of the wealthier citizens take lodgings in the villages, during the season of vintage. The principal cities or towns of Campagna, are Rome, Velletri, Frascati, Palestrina, Terracina, Nettuno, and Ostia. N. lat. $41^{\circ} 18'$ to 42° . E. long. $12^{\circ} 14'$ to $13^{\circ} 29'$.

CAMPAGNAC, a town of France, in the department of Aveyron, and chief place of a canton in the district of Milhau; the place contains 1531 inhabitants, and the canton 6107. The territory comprehends 140 kilometres, and 7 communes.

CAMPAGNE, a town of France, in the department of the Straits of Calais, and chief place of a canton in the district of Montreuil; 2 leagues west of Hesdin. The place contains 1209, and the canton 11,508 inhabitants: the territory includes $212\frac{1}{2}$ kilometres and 25 communes.

CAMPAGNOL VOLANT, (Daubent,) in *Zoology*, Schreber's *VESPERTILIO HISPIDUS*, and great bearded bat of Senegal. Penn. Syn.

CAMPAGNOL, of Buffon, is the short tailed rat of English writers, *Mus campagnols* of Gesner, and *mus arvalis* of Pallas, Schreiber, &c.

CAMPAGN signifies a field, an open or level country.

In a military point of view, it is used to denote the space of time, every or each year, during which troops are kept embodied as an army, or at least in a condition to stop, thwart, or traverse the progress of the enemy.

This term is also employed to express the number of years which an officer or soldier has served. This officer has ten campaigns over his head, that is to say, he has been ten years in the service: this soldier has made sixteen campaigns, that is, he has served sixteen years.

It is likewise made use of to signify the operations of a campaign. Thus we say, he wrote the history of that

campaign; by which we mean to say, that he wrote the history of the transactions and operations that took place during that campaign. A general is said to begin or open the campaign when he commences his operations.

The genuine object of a campaign is to attack your enemy, or to defend yourselves, or to succour an ally; and whichever of these be the object, it is necessary to have armies more or less numerous, money to pay them with, and to defray the other expences attending it, and considerable magazines of every sort near the frontiers, where the armies are to assemble and operate. The general plan of a campaign is the result of political deliberation and arrangement, and is regulated by circumstances and conjunctures.

Though campaigns may have different objects, as well as be opened and carried on at different times and seasons, they may all be considered as falling under the following distinctions or denominations:

Offensive campaigns.

Defensive campaigns.

Summer campaigns, and

Winter campaigns.

In an *offensive war*, you ought to consider whether it is best to act offensively every where, or to act on the defensive in one quarter, to enable you to act with more vigour and effect in another. It is most advisable to attack a country of which the conquest has a tendency to lead to a speedy peace, or at least to prove favourable to the opening of the next campaign. But it is of importance, before you undertake any such enterprise, to know to a certainty that the powers, whose jealousy you might excite, will not oppose the conquest you intend to make.

In a *defensive war*, you ought to consider what frontiers it is of most consequence to defend. When you are inferior to the enemy, and find it difficult to defend your country with small armies, you should take care not to divide your force, but to keep your troops together in those quarters where you have most to fear, in order to engage him with all your force, should you be under the necessity of fighting him. Such considerations may sometimes determine you to abandon one tract of country, and lay it waste, in order to preserve and protect another of greater importance.

When your object is to succour or assist an ally, either in virtue of a treaty concluded with him, or to prevent his being subdued by some formidable power that wishes to invade his country, and strip him of his territories, you should, in the first instance, have some strong and secure places of his put into your hands to prevent his making a peace without your participation and concurrence, and to keep open a safe retreat for you, should you be forced to retire.

In every situation and species of warfare, either in commencing or continuing it, you ought not to enter on a campaign but after much and mature deliberation. You should weigh every circumstance, consider what may happen, and suppose even the worst, that you may not be surprised by incidents or events, but benefit by such as are favourable, and speedily remedy those that are otherwise.

You should not invest more than one person with the chief command of an army. For persons who enjoy equal authority are generally of different sentiments and opinions; and although no inconvenience arose to the allies from the co-equal and joint command of prince Eugene and John duke of Marlborough, which was owing principally to the prudence and great good sense of the latter, and to a magnanimity of mind natural to both, yet it ought not to be quoted as an example for imitation.

You should keep your preparations as secret as possible, and endeavour to open the campaign with some blow or enterprise of importance, not suspected by the enemy; and when

when you act in concert with allies, you ought to arrange and settle with them a general plan, that your success may be thereby rendered more certain and rapid, and that the operations of the different armies may be so regulated and conducted, particularly in respect of time, which governs in the affairs of war, as to be conducive to the bringing about of the same object or end.

When a general is appointed to act, either offensively or defensively, it is necessary for him to have an exact knowledge of the situation, condition, and nature of the frontier and country where he is to act, to be able to settle properly a particular plan for the campaign. His conduct or management of a *campaign* is his manner of executing the plan of operations offensive or defensive, that he has formed.

The general maxims for a campaign of *offensive* operations are chiefly the following:

To undertake no enterprise without mature deliberation.

To observe profound secrecy; as the best plans and designs are those which the enemy is not only ignorant of, but does not even suspect.

After an enterprise is once resolved on, to carry it as speedily into execution as possible.

To undertake no enterprise rashly, but to consider well the possible ways and means of executing it, and to be prepared to overcome with prudence and resolution the probable obstacles you may meet with in the execution.

Before you undertake any thing, to form magazines in different situations near your army, and to procure the means of transporting them with facility from one place to another.

When you penetrate into an enemy's country, to advance gradually rather than leave strong fortresses behind you, and not to move unnecessarily to a distance from navigable rivers convenient for the transport of ammunition and provisions.

Not to enter on any enterprise without securing a communication with your depots, and establishing a protection for your convoys.

On entering an enemy's country to make the natives and people believe that your force is much greater than it really is, by undertaking as many enterprises at once as you can with success and safety.

To establish and strengthen yourself in some advantageous position as a central post, from which you can support all your subsequent movements.

To study the courage, talents, and disposition of your officers and soldiers, to know which of them are fittest for one sort of service or enterprise, and which for another.

To take care to give your orders in writing, always when you can, as clearly and concisely as possible.

To render the condition and situation of the troops as pleasant and comfortable as you are able, whilst you make them observe a rigid and exact discipline, and inure them to exercise and labour.

To conciliate the esteem and affection of your troops.

To choose such advantageous positions as will enable you to support and command all operations to a considerable extent on every side of them, as will force the enemy to quit his and put it in your power by short, simple, and easy movements on your part to compel him to make long, tiresome, and circuitous marches.

Not to revile or reproach your troops when they happen to be beaten, but to animate them and renovate their spirits.

To endeavour by every method to procure exact information in regard to the enemy's force and designs; and, above

all things, to become acquainted with the real characters, dispositions, ruling passions, and propensities of the generals opposed to you.

These maxims ought also to be observed by a general who is entrusted with the conduct or management of a defensive campaign. There are a few others, however, peculiar to it, which it may not be improper to take notice of.

He should endeavour to discover on what part of the frontier the enemy intends to assemble his troops, and of the object he has in view, by the situations, number, and nature of his depots; to put himself in a condition to oppose and frustrate his designs by provisioning and furnishing with sufficient supplies the places that are most important and most exposed, by reconnoitring good and strong positions, and by taking every possible measure to prevent anticipation on the part of his opponent.

A general acting defensively should avoid an engagement where superiority in numbers is of much avail; and, on the other hand, he ought to embrace any favourable opportunity of fighting the enemy in a situation where disposition is every thing, and number nothing.

He ought himself to be active, vigilant, bold, enterprising, and capable of enduring fatigue.

He should endeavour, by every stratagem, to draw the enemy into disadvantageous and dangerous situations, where he can attack him with advantage, and without much risk of losing many men.

He ought not to occupy any position which the enemy can surround or shut him up in.

He should, where it is necessary, secure his camp with intrenchments, placing his flanks out of the reach of insult.

A general who has made some conquests, comes to be on the defensive when he is stopped in his career of victory. He should, therefore, seriously consider whether he is able to keep or preserve them, and what measures he ought to adopt for that purpose. For it is sometimes easier to make conquests than to retain them after they are made.

When a general is on the defensive, it is a material consideration for him to be able to foresee in good time and determine where he shall retire to, in order to take up his winter quarters, and to possess himself of every thing that can contribute to ensure their tranquillity. If at the close of a campaign he finds he has but little or no country left him to defend, no allies, with whom he can take refuge, or from whom he can receive succour or support, and that his means of repelling the enemy are exhausted, it is best for him to demand an armistice, and to open negotiations for peace.

The close, end, or conclusion of a *campaign* is the time when the opposing armies go into winter quarters. Sometimes one of them remains in the field longer than the other, but they generally both retire from it at the same time.

Summer campaigns. Almost all campaigns are made in summer, and none in winter, except in cases of necessity, or when great and important advantages are expected to be derived from them.

Campaigns are generally opened in the spring; but some nations are later in opening them than others. In this respect some are necessarily regulated by climate, while others are governed by custom.

It has been customary for most of the nations of Europe to open their campaigns in the month of March. The Turks are always later than them in taking the field, and quit it sooner. This is owing to the great extent of country from which they have to collect their militia, their

great number of cavalry, for which they must have pasture, and the immense quantities of baggage they carry along with them.

Most generals have endeavoured to take the field as soon as they were in readiness for entering on the campaign, or as circumstances would permit. But the celebrated and very successful marshal Saxe was an advocate for taking the field late in the season. On this subject he expresses himself in these words:

"Many persons are of opinion that it is advantageous to take the field early; in which they judge very properly, provided there is any important post to be seized or enterprise to be executed that requires it; but otherwise I am far from concurring with them, and think there is no occasion for such precipitate measures, but, on the contrary, that it is even prudent to remain in winter quarters much longer than the usual time. The enemy's being suffered to lay siege to a place is of no signification, because he will thereby only weaken and dispirit his troops; and if you fall upon him towards the autumn with an army well disciplined and in good order, he must infallibly be ruined. I have always remarked that a single campaign reduces an army one-third at least, and sometimes one-half, and that the cavalry, in particular, is in so wretched a condition by the beginning of October, as to be no longer able to keep the field."

Winter campaigns, are campaigns carried on in winter.

There are some countries in which the climate is so severe, and the frost so intense, that it is impracticable to make campaigns in them in winter. But in others, where they are practicable, in consequence of the mildness of the climate, there are circumstances that sometimes render them necessary, and point out such great advantages to be derived from them, though very distressing and injurious to troops, that a general does not much hesitate about undertaking them.

If an enemy has taken up his winter quarters in one of your provinces or districts of country, with the intention of invading a neighbouring or adjoining province early in the spring; and you understand that his cantonments are much scattered or extended, and think you can approach them without his being apprised of your design in sufficient time to collect his force, beat them up in succession or detail, and disperse his army, obliging him to retire and abandon that tract of country, you ought to open a winter-campaign for the accomplishment of such an object.

There are but few circumstances or considerations, however, that will justify the opening of a winter-campaign, which ought not on any account almost to be made in a country where there are many strong places, which cannot be reduced but by long and tedious sieges.

Frederic II. king of Prussia, who made more winter-campaigns than any other general of the last century, in speaking of them expresses himself in the following words:

"Winter-campaigns are the ruin of your troops, not only on account of the sickness they occasion, but because from your continual motion they can neither be clothed nor recruited. The same want of repose prevents all your carriages, &c. from being properly repaired, and ends in their total destruction.

"Nothing can be more certain than that the best army in the world cannot long support such campaigns; for which reason winter expeditions ought by all means to be avoided; not but that there is a possibility of a general being so circumstanced as to be obliged to have recourse to that kind of ruinous war."

CAMPAN, in *Geography*, a town of France, in the department of the Higher Pyrenées, and chief place of a canton, in the district of Bagnères, seated in a valley, which

derives from it its name; 1 league S. of Bagnères-en-Bigorre. The place contains 4,200, and the canton 7,224 inhabitants; the territory includes 250 kilometres, and 7 communes.

CAMPANA, a town of Naples, in the province of Abruzzo Ultra; 8 miles S.S.E. of Aquila.—Also, a town of Naples, in the province of Calabria Citra; 9 miles S. W. of Cariati.—Also, a small island in the South Pacific Ocean, near the west coast of South America. S. lat. 48° 50'. W. long. 77° 51'.—Also, a river of South America, which runs into the Pacific Ocean. S. lat. 48° 50'. W. long. 77° 41'.

CAMPANA, *La*, a town of Spain, in the country of Seville; 13 miles W. of Ecija.

CAMPANA *Flora*, in *Botany*, a name given by Helwing, and some other of the German authors, to the plant we call *pulsatella*, or the *pasque flower*. It was named *campana Flora*, or *Flora's bell*, by Helwing, because of its being the signal of the approach of spring. In the Linnæan system, this is a species of the ANEMONE.

CAMPANACEI, the thirty-second natural order in the *Philosophia Botanica* of Linnæus, and the twenty-ninth of the Posthumous Lectures published by Giske. It contains the following genera: *Evolvulus*, *Convolvulus*, *Ipomea*, *Retzia*, *Falckia*, *Polemonium*, *Campanula*, *Canarina*, *Roëlla*, *Phyteuma*, *Trachelium*, *Jasione*, *Lobelia*, *Viola*, *Parnassia*. Those printed in Italics are not mentioned in the *Philosophia Botanica*. None of them are arboreous; few shrubby; in all, the leaves are alternate, the calyx five-cleft, the corolla five-cleft, the stamens five, the style one (except in *evolvulus*, in which it is not certain whether it has four styles, or one style with four stigmas,) and the pericarp a capsule. They are all lactescent, at least when young and tender, and have a purgative slightly poisonous quality; they have all a common character, but it is not possible to give them an exclusive one by which they may be distinguished from all others.

CAMPANARIO, in *Geography*, a town of Spain, in New Castile; 10 miles from Paluccio-del-Rey.

CAMPANELLA, THOMAS, in *Biography*, a philosopher of Italy, prompted by his genius to bold innovations, and remarkable for the sufferings occasioned by them, was born at Stilo, a village of Calabria, in 1568, and distinguished himself, at a very early period, by his talents and application. At the age of 14 years he wrote verses with great facility; and in his 15th year he entered into the order of the Dominicans. Having acquainted himself betimes with the scholastic theology of the age in which he lived, he directed his attention with great ardour to the study of philosophy; and dissatisfied with the opinions of Aristotle and other ancient philosophers, because, as he says, he did not find them conformable to the great volume of nature, he imbibed the bold and free spirit of inquiry manifested by Teleseus, in a work "On the Nature of Things," which then engaged much attention in Italy. Accordingly he published, at Naples, in 1591, a defence of this work in direct opposition to the philosophopoy of Aristotle, under the title of "*Philosophia Sensibus demonstrata*," or, *Philosophy demonstrated to the Senses*. His determined opposition to long established tenets, and his contempt of the authority of Aristotle, excited prejudices against him among his monastic brethren. Nevertheless, as he had some powerful patrons, he persevered in his design of attempting the reformation of philosophy: and he wrote two treatises, one "*De Sensu Rerum*," on sensation; the other, "*De Investigatione*," on investigation; thus proposing to direct young persons in the acquisition of the knowledge of things, by a more easy and effectual method than that which had been taught by Aristotle or Plato. However, he was at length under a necessity of saving himself from insult and persecution.

persecution by removing from Naples to Rome, and afterwards to Florence, Venice, Padua, and Bologna. At this latter place all his papers were clandestinely taken away and sent to the inquisition at Rome. At last he settled in his native country, and with a view of disguising his innovations, wrote in defence of the See of Rome. In 1599 he was suspected of entertaining hostile designs against the Spanish government, and of making himself master of the Higher Calabria; and committed to prison at Naples, under a charge of high treason. He was seven times subjected to the torture, and during his confinement he was, for a considerable time, debarred the privilege of reading and writing, and of all intercourse with his friends. Among other accusations alleged against him, he was charged with having written a book, entitled "De Tribus Impostoribus," which, as he himself says, had been printed 30 years before he was born; when the rigour of his confinement was so far abated, that he was allowed to write and to correspond with his learned friends, he composed several books, which were published in Germany. Many attempts were made for his liberation; and, at length, in 1626, pope Urban VIII. prevailed upon Philip IV. of Spain, to acquit him from the charge of treason, and he was removed to the prison of the inquisition at Rome, where he was confined under a pretext of heresy till the year 1629, when he was finally liberated, after an imprisonment of about 30 years. The pope, who was a patron of learned men, in consideration of his sufferings, granted him a pension, together with the title of his domestic. But here he was still pursued by the resentment of the Spaniards, and, therefore, the pope warned him of his danger, and assisted him to make his escape to France, where he experienced the favour of cardinal Richelieu, who procured for him a pension from Louis XIII. At Paris he lodged in the Dominican convent of St. Honore, and was much respected by men of learning, who sought his conversation. This happy change in his situation was of no long continuance, for he died in 1639, as some have said, from the imprudent use of anti-mony.

Campanella was much more distinguished by the fertility of his imagination than by the soundness of his judgment. In this latter respect he was notoriously deficient, as many of his reveries sufficiently evince. Beside the credit which he gave to the art of astrology, and to a variety of supernatural cures, some of which resemble those of the Mesmerians or Magnetisers of a later period, he fancied that demons appeared to him, and in a state between sleeping and waking, warned him of any threatening dangers. But, notwithstanding the eccentricity of his genius, and his childish credulity, he had his lucid and happy intervals, in which he reasoned more soberly. The extent of his erudition appears from his numerous writings, and particularly from his treatise "De Recta Ratione Studendi," or, on the right method of studying; in which he pronounces judgment on a number of authors in philosophy, poetry, oratory, history, theology, medicine, and mathematics, and lays down excellent rules for the prosecution of philosophical studies, and the knowledge of nature, which he proposes to deduce from observation and experience. Many of his own opinions, however, on dialectics, physics, and ethics, were unintelligibly abstruse, and expressed with great obscurity. Whilst it seems to have been his aim to recede as far as possible from the system of the Peripatetics, his own logic abounds with subtle distinctions, useless terms, and obscure rules, which are not easily comprehended. Concerning nature, his leading doctrines were, that sense is the only guide in philosophy; that space is the first incorporeal substance, immoveable, and the receptacle of all bodies; that time is the successive duration of

things, and only measured by motion; that heat and cold are the two principles, which act on the mass of matter, the heavens having been produced by the former from rarefied matter, and the earth by the latter, from matter condensed; that the sun and earth are the two elements, whence all things are produced; that all animal operations are produced by one universal spirit; that all things in nature are endowed with feeling and perception; that the world is an animal or sentient being, inspired by a soul, by which it is directed, as man is by the divine principle within him; that the first, greatest, and only true being, in whom power, wisdom, and love exist as primary principles, transmits his inexhaustible ideas by means of the active causes, heat and cold, to the corporeal masses, supported in space, the basis of the world, which itself has its stability in God; that all creatures are excellent in proportion to the degree in which they bear the image of essential principles of the divine nature; and that human depravity consists in the loss of this image, and human perfection in its restoration. His works contain a variety of other articles, which are very fanciful and obscure. It redounds, however, in no small degree to the praise of Campanella, that he exposed the futility of the Aristotelian philosophy, and that he wrote an apology for Galileo, with a defence of his system. His acuteness in the science of politics is displayed in his "Political Aphorisms," and in his book "De Monarchia Hispanica;" but his principles resemble those of Machiavel. Whilst he professed to be a reformer in philosophy, he was destitute of that sober and sound judgment, which was necessary for producing any very important and permanent effect. He was accused of impiety; but he seems to have been rather a fanatic and enthusiast than an atheist. He was also accused of suggesting cruel measures against the protestants, and, as Mosheim says, not without reason. Brucker's Hist. of Philos. by Enfield, vol. ii. p. 529. Mosh. Hist. vol. iv. p. 164.

CAMPANELLA, in *Geography*, a cape on the coast of Italy, nearly south from the city of Naples, across the gulf, of which it is the most southerly point. The island of Cabrera lies to the west of it. See CABRITA.

CAMPANIA, now CAMPAGNA, in *Ancient Geography*, the most pleasant and fertile province of Magna Græcia, described by the ancients under the appellation of "Regio Felix." It extended from the N.W. to the S.E. along the Mediterranean; and was bounded on the N.W. by Latium, on the S.E. by Lucania; and separated from Samnium by a chain of mountains. Its principal mountains were Mæticus, Gaurus, and Vesuvius; its lakes were the Avernus and Lucrinus; its rivers the Savus, Volturnus, Clanis, and Silarus, which separated it from Lucania. Capua was considered as its capital; besides which it had several other considerable towns. See CAMPAGNA.

CAMPANIAN *disease*, *Morbus campanus*, in *Antiquity*, is variously explained by modern writers. Some will have it only a sort of tubercles, or warts, on the face, to which the people of Campania were liable. Others maintain it to be the venereal disease; and hence draw an argument against the supposed novelty of that malady. Dacier will have it to be something still worse; the Campanians, it seems, were addicted to a sort of commerce too abominable to be named, *ore morigeri erant*. Whence it is, Plautus represents them as more pathic or passive than the Syrians themselves. Hor. Stat. v. lib. i. ver. 62. cum not. Dacier.

CAMPANIFORM, or CAMPANULATED, in *Botany*, a denomination given to flowers in their form resembling a bell.

CAMPANILE, in *Architecture*. This word, derived from *Campana*, Ital. a bell, is particularly used to denominate the bell towers which it is customary in Italy to erect, not like

like our steeples upon the churches, but detached from them.

These edifices ornament most of the Italian towns, and are many of them remarkable for loftiness and magnificent decoration. Of these, the campanile of Cremona is the most celebrated: this structure is 395 feet in height, including the cross; a square tower rises 262 feet, which is surmounted by two octagon stories, open to the air, and ornamented with columns; a conical shaft and a cross terminate the elevation. The campanile of Florence is a tower of 267 feet high, on a base of 45 feet square, entirely encrusted with marble of various colours. It was built from the designs of Giotto, and in spite of the vestiges of a barbarous taste which it exhibits, must be admired for its richness and workmanship.

Great elevation combined with narrowness of base has occasioned, in several of these buildings, considerable settlements, and remarkable deviations from the perpendicular. This effect is sensible in the campaniles of Ravenna, Padua, and St. Agnus at Mantua, but particularly in those of Bologna and Pisa. The campanile of Bologna, which is called the tower of Garisendi, built in 1110, is 153 feet in height, and varies eight feet and a half from the perpendicular. It has been often asserted, that the tower was purposely so constructed, by the caprice of the architect; however, the interior of the building, the tables of the windows, and even the scaffolding holes, have all the same inclination, which seems sufficiently to prove it to be owing to the sinking of the ground. The durability of this tower is owing to its construction with bricks, and an excellent cement, which seems to unite the whole into one mass. The neighbouring tower, called *Dagli Asinelli*, has an elevation of 320 feet, and an inclination of three feet and a half, but the overhanging of the first is so remarkable, that this is not perceived.

The campanile of Pisa, called *Torre Pendente*, is, however, the most extraordinary of these. Its form, which is neither of a bad proportion, nor ill decorated, is a cylinder surrounded with eight stories of columns placed over one another, having each its entablature: the last story, which forms the belfry, retires from the general line of elevation. All the columns are of marble, and seem to have been taken from the ruins of ancient edifices; each column carries the springing of two arches, and there is an open gallery between the columns and the circular wall of the tower.

The height to the platform is 150 feet, and a plumb line lowered thence to the ground falls nearly 13 feet beyond the base of the building.

CAMPANO, GIANANTONIO, or JOHN ANTHONY, in *Biography*, an eminent Italian philologist, was born in Campania, in 1429; and from the obscure condition of a shepherd, became a distinguished scholar and writer. At Naples he enjoyed the benefit of Lorenzo Valla's instruction; and at Perugia, having in his 23d year applied to the study of the Greek language, he was advanced to the office of professor of eloquence, which he occupied with great applause. In 1459, he attached himself to the Roman court, and ingratiated himself with pope Pius II. to such a degree, that he was created by him, first, bishop of Crotona, and then of Teramo. At Rome he assisted Udalric, called Gallus, the first printer who settled there, in preparing MSS. for the press, and correcting them when printed, and writing prefaces for several of his editions. In 1471, he was deputed by Paul II. to the congress of Ratibon, held for the purpose of framing a league among the Christian princes against the Turks; on which occasion he employed himself in collecting ancient MSS., which he sent into Italy. Campano was raised suc-

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cessively by Sixtus IV. to the governments of Todi, Foligno, and Citta di Castello. But as he remonstrated with the pope on the calamities which the inhabitants of the latter place suffered, when it was besieged by his troops, he was deprived of his government; and withdrawing from the ecclesiastical state, he repaired to the court of Naples. But being disappointed of the preferment which he expected, he retired to Teramo, where he closed his life, in 1477. His various works, consisting of political and moral treatises, orations, letters, eight books of Latin poems, and the History of Andrew Braccio, were published by Michael Ferno; and a new collection of them was edited at Leipzig by Mencken in 1707 and 1734. Gen. Dict. Tiraboschi.

CAMPANO, *Novarese*, a distinguished Italian geometer and astronomer, flourished in the time of Urban IV., to whom he was chaplain, in the 13th century. He wrote Commentaries on Euclid, and he is said to have translated Euclid into Latin from the Arabic version; but Tiraboschi ascribes this translation to Adelard, an English monk. He also wrote a treatise on the quadrature of the circle.

Several astronomical works of his composition, which treat of the motions of divers planets, or the instruments necessary for observing them, on the ecclesiastical computation, and on the theory of the planets in general, exist in MS. in various libraries. Tiraboschi.

CAMPANOLOGIA, from *campana*, bell, and *λογία*, science, the art or science of ringing of bells.

CAMPANULA, in *Botany*, (Lat. a little bell.) Linn. gen. 218. Tourn. Tab. 37. Schreb. 290. Gært. 586. Tab. 31. Willd. 329. La Marck, Illust. 345. Tab. 123. Juss. p. 164. Vent. vol. ii. p. 470. Class and order, *pentandria monogynia*. Nat. Ord. *Campanaceæ*, Linn. *Campanulacæ*, Juss.

Gen. Ch. *Cal.* perianth superior, five-cleft, Linn. Gært. Lam. (in some species ten-cleft; five of the segments reflexed, and covering the capsule, Juss.) *Cor.* monopetalous, bell-shaped, five-cleft, shrivelling; segments broad, acute, spreading. *Nectary* in the bottom of the corolla; composed of five, acute, connivent valves, covering the receptacle. *Stam.* five, capillary, very short, inserted on the tips of the valves of the nectary; anthers longer than the filaments, erect. *Pist.* germ inferior, angular; style thread-shaped, generally longer than the stamens; stigma two, three, or five-cleft, oblong, thickish; segments revolute. *Peric.* capsule inferior, angular; either top, egg, or prism-shaped; two, three, or five-celled; in most species emitting the seeds at as many lateral holes as there are cells; in a few, opening by valves. *Seeds* numerous, small, adhering to a columnar receptacle. Eff. Ch. *Cor.* bell-shaped, closed at the bottom by valves bearing the stamens. *Stigma* two, three, or five cleft. *Cap-sule* inferior; two, three, or five-celled.

Obs. What Linnæus calls the valves of the nectary are considered by Gærtner, Jussieu, and La Marck, simply as connivent dilatations of the filaments, forming a kind of vault over the receptacle. Dr. Smith drops the idea of a nectary, and says, that the bottom of the corolla is closed by stamiferous valves.

* *Calyx* five-cleft. *Cap-sules* top or egg shaped.

† *Leaves* almost smooth, not harsh to the touch.

Sp. 1. *C. cenifolia*, Linn. Sp. Plant. Supp. p. 1669. Willd. 1. Mart. Mil. 1. Lam. Enc. 1. Illust. 2489. Allion. Ped. 35. Tab. 5. f. 1. Hall. Helv. n. 696. "Stems one-flowered; leaves egg-shaped, entire, somewhat ciliated." *Root* perennial, creeping, often a foot long, fibrous. *Stems* simple, small, weak, about two inches high. *Root-leaves* about an inch long, roundish-spatule-shaped, entire, nearly smooth. *Stem-leaves* oblong-egg-shaped, slightly hairy, sessile. *Flower* blue,

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blue, terminal, large in proportion to the size of the plant; calyx rough, with short, white hairs. A native of the Alps about mount Cenis, introduced into England in 1755, by Dr. Fothergill and Dr. Pitcairn. 2. *C. vesula*, Willd. 38. Mart. 69. Lam. Illust. 2490. Allion. pedem. n. 397. Tab. 7. fig. 1. "Stem one-flowered, nearly naked; leaves smooth, oval, toothed; calyx smooth." Root perennial. Stem about six inches high, round. Root-leaves numerous, petioled, decurrent, acute, nerved beneath. Calyx cleft beyond the middle. Corolla spreading. Found by Allioni at the foot of mount Vesulo in Piedmont. 3. *C. Bellardi*, Willd. 3. Mart. 68. Lam. Illust. 2491. Allion. Ped. n. 396. Tab. 85. fig. 5. "Stem one-flowered, nearly naked; leaves petioled, elliptic lanceolate, toothed." Root perennial. Stem an inch and a half high, erect, rather firm, round, smooth. Leaves drawn to a point at each end, deep green, roughish, firm, and not juicy. Flower blue, upright; calyx smooth, cleft beyond the middle; segments lanceolate-linear, not expanded. A native of Piedmont. 4. *C. uniflora*, Linn. Sp. Pl. 1. Flor. Lap. Tab. 9. fig. 5. 6. Willd. 2. Mart. 2. Lam. Enc. 2. Illust. 2492. "Stem one-flowered; calyx equalling the corolla." Root perennial. Stem simple, about three inches high, upright. Root-leaves oblong-egg-shaped, obtuse; stem-leaves longer, lanceolate-linear. Flower blue, terminal, nodding. The whole plant slightly hairy. A native of mountains in Lapland. 5. *C. hederacea*, Linn. Sp. Pl. 38. Willd. 82. Mart. 53. Lam. Enc. 5. Illust. 2493. Mor. hist. 2. p. 456. Sect. 5. Tab. 2. fig. 18. Flor. Dan. Tab. 330. bad. Eng. bot. 73. "Leaves heart-shaped, five-lobed, petioled, smooth; stem flaccid." Root perennial, fibrous, small. Stems procumbent, creeping, wide-spreading, slender, branched, smooth, leafy. Leaves opposite or alternate, tender, smooth, with the exception of a few scattered hairs. Flowers pale blue, terminal and axillary, nodding, some withering after they are gathered. Capsule small, hemispherical. A native of England, Denmark, France, and Spain, in moist shady places. Linnæus, without sufficient reason, supposed it a hybrid plant, from some campanula impregnated by *Veronica hederifolia*. 6. *C. cochlearifolia*, Lam. Enc. 4. Illust. 2494. Willd. 73. Barrel. ic. 454. "Stems simple, one-flowered; root-leaves roundish-heart-shaped, scolloped, on long petioles; stem-leaves smaller, somewhat spatula-shaped, acute; flower drooping." Stems three inches long, leafy, simple, weak. Root-leaves numerous, smooth, scarcely four or five lines broad. Flowers blue; calyx very short, with five acute teeth. A native of the Italian Alps. 7. *C. Elatines*, Linn. Sp. Pl. 37. Willd. 80. Mart. 52. Lam. Enc. 5. Ill. 2495. Allion. Ped. n. 422. Tab. 7. fig. 1. Barrel. ic. 453. "Leaves heart-shaped, toothed, pubescent, petioled; stems prostrate; peduncles capillary, many-flowered." Root perennial. Stems many, generally simple, round, pubescent, springing from the fissures of rocks. Leaves alternate, on long petioles. Racemes axillary, with about three flowers, sometimes branched. Flowers purple, cleft half way down; segments lanceolate, revolute. All the flowers have a linear bract except the upper one. The whole plant is very milky and pubescent, with short hairs. A native of Piedmont at the foot of the Alps. 8. *C. pulla*, Linn. Sp. Pl. 2. Willd. 4. Mart. 3. Jacq. Obs. 1. p. 30. Tab. 18. Aufst. 3. Tab. 285. "Stems one-flowered; stem-leaves egg-shaped, scolloped; flower drooping." Root perennial, small, creeping. Stems five or six inches high, slender, upright, zigzag; sometimes having one or two flowering branches, each with a single flower. Root and stem-leaves egg-shaped, obtuse, petioled. Flower deep blue, terminal; calyx smooth. There is a variety with roundish leaves, and more than one

flower. A native of mountains in Austria, Stiria, and Aragon. 9. *C. rotundifolia*, Linn. Sp. Pl. 3. Willd. 12. Mart. 4. Lam. Enc. 7. Illust. 2498. Curt. Flor. Lond. 4. 21. Eng. Bot. 866. "Root-leaves kidney-shaped; upper leaves linear." Root perennial, branched, somewhat woody. Stems several, from two or three inches to a foot or more in height, rather upright, but weak, round, smooth, milky, branched. Leaves smooth; root-leaves petioled, generally toothed, but sometimes quite entire; stem-leaves near the base lanceolate and toothed; near the summit linear and entire. Flowers blue, sometimes white, nodding; segments of the calyx linear, smooth, grooved, expanding horizontally when out of blossom; valves of the nectary fringed, pointed, white. The root-leaves from which this species, rather inconveniently, and, indeed, somewhat improperly, takes its name, are seldom observed, being usually concealed among the surrounding grass and leaves of other plants, and withering away as the plant advances to maturity. The juice of the flowers stains blue, but, with the addition of alum, produces a green pigment. It varies so much from soil and situation, that authors differ greatly from each other with respect to what are only varieties, and what are really distinct, though kindred species. Willdenow asserts, that *C. rotundifolia* of Allioni, (Flor. Ped. n. 398. Tab. 47. fig. 2.) quoted by Martyn, is certainly a distinct species, since it appears, from Allioni's figure, to be very different from *rotundifolia* of Linnæus in the form both of its leaves and of its corolla. La Marck speaks of a variety which he has found in Auvergne, which differs in habit from *rotundifolia*, but, upon examination, is found to resemble it in all its botanical characters, except that its stem-leaves are long lanceolate, and narrowed into a petiole at their base. 10. *C. pumila*, Curtis, Bot. Mag. 512. (*rotundifolia* β . Linn. Minor *rotundifolia* alpina, Bauh. prod. 34. *C. pumila*, Jacq. 2. p. 79? *C. cespitosa*, Lam. Ill. 2497. Enc. *C. pulla*, γ . "Root-leaves egg-shaped, scolloped; petioles flattened; flowers in unilateral racemes, drooping." A plant of much humbler growth than *rotundifolia*. Root-leaves never kidney-shaped; on short, flattened, not thread-shaped, petioles; continuing during the time of flowering, and forming a mat, not disappearing like those of the preceding species; lower stem-leaves often of the same shape. It bears a profusion of flowers, and being a hardy perennial, is particularly suited to adorn rock-work. There is a variety with white flowers. According to Curtis, the *cespitosa* of Scopoli (n. 225. Tab. 4.) is probably a variety. Professor Martyn has taken it up as a distinct species, though he had before quoted it as a synonym under *C. rotundifolia* β , the *pumila* of Curtis. Villars, dauph. 2. 500. Hall. helv. n. 702. Bauh. Prod. 34, are also quoted by him under both. 11. *C. angustifolia*, Lam. Illust. 2499. "Stems many-flowered; lower leaves lanceolate, egg-shaped, petioled; stem-leaves narrow, acute, sessile." A native of the south of France. La Marck asserts that though nearly allied to *rotundifolia*, it is distinct, and refers to Gmelin, Sib. 3. tab. 33. 12. *C. subuniflora*, La Marck Illust. 2500. (*uniflora*, Vill. Dauph. 2. p. 500. tab. 10. *linifolia*, Willd. 13?) "Lower part of the stem somewhat hairy; lowest leaves egg-shaped; upper ones narrow-lanceolate; flower terminal, erect. Small abortive flowers are found in the axils of the upper leaves." There is a variety entirely hairy, which La Marck conjectures may be *C. valdensis* of Allioni (Flor. Ped. n. 400. tab. 6. fig. 1.) The *valdensis* is taken up by Martyn as a distinct species; and *C. Scheuchzeri* of Villars (Dauph. 2. 503. tab. 103. taken up from Scheuch. it. 454. tab. 14. fig. 1.) is quoted as a synonym. Willdenow supposes the *valdensis* of Allioni to be his *linifolia*, and *C. Scheuchzeri* a variety.

13. *C. pubescens*, Willd. 14. Schmidt. Bohem. n. 167. "Stem hairy; leaves smooth; root-leaves heart-shaped; stem leaves oblong, toothed, petioled." *Root* perennial. *Stem* decumbent, angular. *Flowers* short, broad. A native of rocky woods in Bohemia. 14. *C. linifolia*, La Marck Enc. 8. Ill. 2501. "Smooth; stem erect, many-flowered; leaves all sessile; the lower ones egg-shaped; upper ones lanceolate-linear." *Stem* about a foot high, simple, smooth. *Leaves* almost entirely smooth; upper ones entire, acute, a little resembling those of flax. *Flowers* blue, peduncled, terminal; calyx smooth, with five erect, acute segments. Found by La Marck in great abundance in the pastures of Mont d'Or, and, as he says, too distinct from *C. rotundifolia* to be confounded with it. 15. *C. diffusa*, Willd. 81. Lam. Illus. 2502. Vahl. Symb. 1. p. 18. Barrel. Ic. 453. "Stems widely spreading; leaves petioled, serrate-toothed; lower ones heart-shaped; upper ones lanceolate; peduncles one-flowered." 16. *C. fragilis*, Mart. 76. Lam. Illus. 2541. Cyril. Rar. Neap. Fasc. 1, 32. tab. 11. fig. 2. (*C. saxatilis*, &c. Bar. ic. 453. Rai. Hist. 741. n. 21.) "Stems procumbent; branches directed one way, many-flowered; root-leaves kidney-shaped, scolloped; calyxes angular." A beautiful plant, but extremely brittle, abounding in milk, commonly quite smooth, bright green and shining, but sometimes lanuginous. *Root* perennial, brown. *Stems* numerous, crowded, branched towards the middle, hanging down from the clefts in the rocks. *Root-leaves* crowded, petioled; stem-leaves alternate, lanceolate, egg-shaped. *Flowers* two or three from the ends of the branches; segments of the calyx lanceolate, acute; corolla large, bright blue, flat, with a very short tube, and sharp, deeply cut segments; edge of the nectary rough with hairs. A native of the kingdom of Naples, about Salerno and Amalphi, first observed by Ray, then by Baraltier, and finally by Cyrilli. 17. *C. limonifolia*, Linn. Sp. Pl. 33. Willd. 74. Mart. 48. Lam. Enc. 63. Ill. 2539. (*C. orientalis*, limonii minimi facie, Tourn. Cor. 3.) "Branches spreading, undivided; root-leaves elliptical, even, entire; flowers sessile, three together." *Branches* rodlike. *Root-leaves* smooth, petioled, not rigid; stem-leaves linear, or awl-shaped. *Flowers* remote, axillary, generally three together; bractes the length of the germ. A native of the East. 18. *C. virgata*, Martyn 77. Lam. Ill. 2540. Labillard. Syr. Dec. 2. p. 11. tab. 6. "Branches rodlike; root-leaves lanceolate, sharp at both ends, toothed, somewhat rugged; branch-leaves very short; flowers in pairs, sessile." *Root* biennial. *Stem* upright, a foot or more high, striated, with few leaves; branches spreading. *Root-leaves* petioled. *Flowers* remote, commonly two together, blue; bractes the length of the germ; segments of the calyx acute; those of the corolla lanceolate, cut almost to the base. *Capsule* top-shaped, angular, three-celled, opening laterally with three holes. A native of mount Libanus. Nearly allied to the preceding, but differing in its deeply cut corolla, and its toothed, rather rugged leaves. 19. *C. patula*, Linn. Sp. Pl. 4. Willd. 22. Mart. 5. Lam. Enc. 9. Ill. 2503. Dill. Hort. Elt. 68. fig. 58. Flor. Dan. 373. Eng. Bot. 42. "Leaves stiff; root-leaves lanceolate-oval; panicle spreading; calyx toothed." *Root* biennial, slender, white. *Stem* a foot and a half high, angular, a little harsh to the touch. *Leaves* rather harsh, scolloped; root-leaves obtuse, petioled; stem-leaves sessile, alternate, acuminate, slightly toothed, few, distant. *Flowers* upright, tapering at the base, spreading at the border; segments of the calyx lanceolate, toothed toward the base. A native of Sweden, Denmark, Germany, Switzerland, Piedmont, but it does not appear to have been found in France, nor is it common in England. We have observed it growing, not only on the outside of Buddon

wood, near Loughborough in Leicestershire, to which Mr. Woodward (Eng. Bot.) confines it, but also, and much more abundantly, within the wood, in its higher and more rocky part. It has also been gathered in several other midland counties, particularly Warwick, Worcester, Stafford, Salop, Hereford, and Surry. 20. *C. gracilis*, Willd. 6. Mart. 67. Forst. Prod. 15. Exot. Bot. p. 87. tab. 45. "Leaves rough, linear-lanceolate; lower ones bluntly toothed. *Stem* round, much branched. *Flowers* solitary, terminal; their tube shorter than the calyx-segments." *Stem* a foot or more high, leafy, two-edged. *Leaves* obtuse; lower ones opposite, the rest scattered. *Flowers* erect, on long peduncles; calyx globose, generally rough with deflexed hairs, but in Forster's original specimen smooth; segments awl-shaped, longer than the body; corolla slender, funnel-shaped, of a rich blue within, paler without; segments acute, fringed, sometimes only four. *Capsule* three-celled, three-valved at its summit. Every part of the herbage rough with a short rigid pubescence. Found by Forster in New Zealand and New Caledonia, raised in England from seeds brought from New South Wales. 21. *C. vinciflora*, Ventenat. Jard. de Malmaison. 12. (Camp. gracilis, Bot. Mag. 691?) "Leaves linear-lanceolate; stem round, much branched; peduncles terminal, elongated, one-flowered." Ventenat supposes his plant and the *gracilis* of Forster to be the same. Dr. Sims (Bot. Mag.) concurs with him; and there is certainly nothing in the specific character, as given by Ventenat, which can lead to a different opinion; but we have kept them separate, in deference to the judgment of Dr. Smith, who thinks the *vinciflora* a distinct species, being smooth, except some scattered longish bristles on the leaves; and having a wider flower, with much shorter calyx-segments, and a less globular capsule. The figures in Exotic Botany and the Botanical Magazine are materially different. We have referred that in the latter, though with some hesitation, to Ventenat's plant, on account of its wide-spreading campanulate, not funnel-shaped, flower, which appears of itself to form a sufficient specific distinction. The teeth, or, as we should rather call them, segments of the calyx, are represented in the Botanical Magazine expanding, which would form another good difference, if Dr. Sims had not in the description expressly stated them to be erect. The smoothness or roughness of the leaves is too variable a character to be of much value. Dr. Smith says that the capsule of *vinciflora* is less globular than that of his *Gracilis*, but in the Botanical Magazine it is evidently more so. Dr. Sims's description differs in several respects from Dr. Smith's. We shall transcribe the most material parts, that future observers may be better able to determine the identity or the diversity of the species. *Stem* square, hairy, generally decumbent. *Leaves* mostly opposite, toothed, somewhat pubescent. *Flowers* nodding whilst in bud, erect when expanded; on long, square, hairy peduncles; calyx egg-shaped, striated; teeth awl-shaped, erect, distant; corolla bell-shaped, cut halfway down into five, sometimes only four, egg-shaped, entire segments; nectaries or valves three-lobed; anthers oblong, disappearing almost as soon as the flower opens; style erect; stigmas three, rolled back, villous. First raised by Mr. Curtis, by sowing the mould that came about the roots of some plants imported from New Holland and New Zealand. It flowers during the greatest part of the summer, and is easily propagated by seeds or cuttings. 22. *C. Rapunculus*, Rampion. Linn. Sp. Pl. 5. Willd. 23. Mart. 6. Lam. Enc. 10. Ill. 2504. Gært. tab. 31. fig. 2. Eng. Bot. 283. (*Rapunculus esculentus*, Rai. Syn. 277.) "Leaves waved; root-leaves lanceolate-oval; panicle contracted." *Root* biennial, spindle-shaped, white, sweet, esculent. *Stem* a foot and half

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or two feet high, erect, angular, rough, especially on the lower part with deflexed hairs. *Leaves* alternate, sessile, toothed; lower ones rather hairy; upper ones smooth. *Bractes* awl shaped. *Panicle* erect; its side branches bearing from one to three or more flowers. *Flowers* bluish purple, or whitish; segments of the calyx sometimes toothed, but not so much so as in *patula*; corolla inflated, not tapering at the base; nectary fringed. *Capsule* crowned with the lanceolate-linear segments of the calyx, retuse, inversely pyramidal-egg-shaped, with three nerves on each of the three blunt angles opening with three lateral holes, a little above the middle. *Seeds* numerous, small, elliptical, lenticularly compressed, smooth, shining, of a pale rust colour. Smith and Gærtner. A native of France, Switzerland, Germany, Piedmont, &c. It has been found in England, about Croydon and Esher in Surry, old Buckenham castle in Norfolk, and Enville in Worcestershire. The fleshy roots and the young leaves are eaten in France in fallads, and are thought to increase the milk in nurses. The roots are also eaten boiled. It was formerly much cultivated in England as an esculent, but is now neglected. In the time of Parkinson its roots were boiled till they were tender, and afterwards eaten cold with vinegar and pepper. 23. *C. persicifolia*, Linn. Sp. Pl. 6. Willd. 26. Mart. 7. Lam. Enc. 11. Ill. 2505. (*Rapunculus persicifolius*, Bauh. Pin. 93.) "Root-leaves inversely egg-shaped; stem-leaves lanceolate-linear, somewhat serrated, sessile, remote." *Root* perennial, esculent. Whole plant, except the germ and capsule, smooth. *Stem* two or three feet high, erect, simple, angular. *Stem-leaves* straight, acute, distant, slightly toothed. *Flowers* in a thin spike, blue, sometimes white, on long peduncles; corolla large, broad, short; bractes two to each peduncle. There is a variety found in low woods, with only two or three large flowers, and long narrow leaves. A double variety, both blue and white, is also common in gardens, called, in some parts of England, Batchelors' Buttons. A native of most parts of the continent of Europe. A magnificent, large-flowered variety from South Carolina, imported by Mr. Dickson of Covent garden, and differing from the European plant only in size, is figured in the Botanical Magazine, 397. It is very hardy and easy of culture, increasing by its roots, which are somewhat creeping, and may be parted either in spring or autumn. 24. *C. ptarmicifolia*, Willd. 39. Lam. Enc. 12. Ill. 2506. Tourn. Cor. 4. "Leaves all linear, toothed; stems simple; flowers erect, sessile." *Stems* scarcely a foot high, smooth. *Leaves* scabrous at their edges with fine spinous teeth. *Flowers* alternate, bluish, forming a spike at the upper part of the stem; calyx short, smooth; corolla oblong, slightly five-cleft; bractes three. Observed by Tournefort in Armenia. 25. *C. linarioides*, Lam. Enc. 13. Illust. 2507. Willd. 15. "Stem rod-like, panicled: leaves linear: flowers erect, terminal." *General habit* that of *Antirrhinum linaria*. *Stem* about a foot high, slender, smooth, slightly striated, panicled at the top. *Leaves* numerous, scattered, minute, with a few, scarcely perceptible teeth. *Flowers* peduncled, small: corolla deeply divided. Found by Commerfon on Monte-Video, near Buenos-Ayres, in South America. 26. *C. pyramidalis*, Linn. Sp. Pl. 17. Willd. 27. Mart. 8. Lam. Encyc. 14. Ill. 2508. (*Rapunculus hortensis*: Bauh. pin. 93.) "Leaves smooth, even, serrated, heart-shaped; stem-leaves lanceolate: stems rush-like, simple: umbels sessile, lateral." *Root* biennial, oblong, fibrous, milky. *Stems* several, near four feet high, smooth. *Leaves* petioled. *Flowers* blue, sometimes white, large, open, coming out several together in lateral and terminal tufts or umbels, on short peduncles: segments of the calyx upright,

linear. Vigorous plants throw out numerous simple, short, lateral branches. A native of Carniola. It is sometimes cultivated in a pot, and set on the hearth of halls, &c. in summer, and by spreading the upright stems on a flat frame composed of slender laths is formed into the shape of a fan, which will nearly cover a common fire-place. 27. *C. americana*, Linn. Sp. 8. but not the synonyms which belong to the next species. Willd. 28. Mart. 9. Hort. Kew. 220. "Leaves heart shaped and lanceolate: petioles ciliated: flowers unilateral; corolla five-cleft, flat." Linn. "Leaves heart-shaped and lanceolate, serrated; petioles of the lower ones ciliated: flowers axillary, sessile; corolla five-cleft, flat; style longer than the corolla." Hort. Kew. *Root* annual. *Stem* and *germs* smooth. *Flowers* three or four from the axil of each leaf or bract: corolla small. Linn. A native of Pennsylvania, introduced into England in 1763, by Mr. J. Bartram. 28. *C. nitida*, Willd. 29. Mart. 74. Hort. Kew. 1. 221. L'Herit. Sert. Ang. (*C. planiflora*, Lam. Enc. 15. Ill. 2509. *C. minor Americana*, Herm. Lugd. 107. *Trachelium minus Americanum*: Dodart. Mem. 4. p. 119. tab. 118.) "Leaves oblong, scolloped, even; stem-leaves lanceolate, nearly entire; corollas bell-wheel-shaped. Hort. Kew. "Leaves oblong, scolloped, rigid, sessile: flowers erect, flat." Lam. *Root* perennial. *Stems* five or six inches high, often simple, straight, stiff, a little striated. *Stem-leaves* smooth, green, gradually diminishing to the top of the stem. *Flowers* blue or white, one or two in each axil of the upper leaves: calyx short; segments oval-acuminate. La Marck doubts whether it be specifically distinct from *C. americana*, though he acknowledges that it differs from it in having no heart-shaped leaves, nor ciliated petioles; and in the flowers not being unilateral: the last circumstance, however, is omitted in the specific character of *C. americana*, drawn up for the Hortus Kewensis. A native of America, described by La Marck from a living plant in the royal garden at Paris. 29. *C. stylosa*, Lam. Enc. 16. Ill. 2510. Willd. 35. Gmel. Sib. 3. tab. 27. good. "Leaves petioled, somewhat heart-shaped, acutely serrated: flowers small, nodding, style longer than the corolla." *Stem* a foot high or more, simple, and, like all other parts of the plant, smooth. *Leaves* scattered, acuminate, decurrent along the petiole with a slight membrane: bractes lanceolate and nearly sessile. *Flowers* oblong, bluish, in a terminal panicle: border obtuse: style very long: stigma club-shaped, slightly three-cleft. A native of Siberia, sent to the royal garden at Paris, under the name of *C. lilifolia*. 30. *C. periplocifolia*, Lam. Enc. 17. Ill. 2511. "Leaves heart-shaped, obtusely serrated, on long petioles: stems ascending, few-flowered." Resembling the preceding, but smaller, and not with upright stems. *Leaves* all petioled, acuminate, smooth, a little toothed or scolloped. *Flowers* terminal, pale blue, resembling those of *C. stylosa*. A native of Siberia, cultivated in the royal garden at Paris. 31. *C. lilifolia*, Linn. Sp. Pl. 9. Willd. 30. Mart. 10. Lam. Enc. 18. Ill. 2512. Amm. Ruth. p. 11. n. 17. Gmel. Sib. 3. p. 143. tab. 26. "Leaves lanceolate; stem-leaves acutely serrated: flowers panicled, nodding." *Root* perennial. It varies in its form and size, and in the number and colour of its flowers; but may in all cases be distinguished from the two immediately preceding by its sessile stem-leaves. A native of Siberia, from the laick eastward to the confines of China. The roots are eaten by the inhabitants boiled and raw. 32. *C. azurea*, Bot. Mag. 551. So-lander MSS. in the possession of sir Joseph Banks. "Leaves oblong, egg-shaped, sessile, serrated: stem simple, angular: flowers panicled." Sol. *Root* perennial. *Stem* erect, quadrangular, with raised, somewhat cartilaginous angles. *Root-leaves*

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leaves few, petioled, heart-egg-shaped; with a few, thinly scattered hairs underneath, chiefly about the margin: *Stem-leaves* alternate, acute, thinly haired. *Flowers* blue: peduncles long, thread-shaped, alternate, axillary, once or twice divided; pedicels nodding, with linear bracts: calyx pentagonal. A native of Switzerland. It flowered in the botanic garden at Chelfa, in 1778. 33. *C. carpatica*, Linn. jun. Supp. p. 140. Willd. 16. Mart. 16. Jacq. Hort. 1. tab. 57. Bot. Mag. 117. "Leaves heart-shaped, serrated, smooth, petioled: peduncles elongated; calyx reflexed, glutinous." *Root* perennial. *Stem* herbaceous, milky, a little branched; in gardens much branched, and many-flowered. *Flowers* blue: calyx five-cleft; segments linear-lanceolate, acuminate, a little reflexed, beset with glutinous glands. Mr. Curtis observes, that it deserves to be better known and more cultivated, being large and strong, and like many other Alpine plants, well calculated to decorate rock-work and the borders of the flower garden. A native of the Carpathian Alps. Sent to the royal garden of Kew, in 1774, by Professor Jacquin. 34. *C. grandiflora*, Linn. jun. Supp. p. 140. Willd. 7. Mart. 17. Jacq. Hort. 3. p. 4. tab. 3. Bot. Mag. 252. (*C. gentianoides*: Lam. Encyc. 19. Ill. 2513.) "Leaves lanceolate, egg-shaped, serrated, nearly sessile: branches one-flowered: flowers top-shaped, spreading: stigma five-cleft." *Root* perennial, white, spindle-shaped, and branched. *Stems* few, about a foot high, feeble, simple, or furnished at the summit with three or four small branches. *Leaves* near two inches long, sometimes growing in threes, smooth, bright green above, a little glaucous and finely veined beneath. *Flowers* large, of a beautiful blue, terminal, and sometimes two or three from the upper axils, green and elegantly pear-shaped before expansion, resembling an air-balloon, whence it has sometimes been called the balloon plant. No holes in the capsule. It was suspected by the younger Linnæus to be only a variety of *C. carpatica*, but Jacquin determined it to be a distinct species. A native of Siberia and Tartary, introduced into England in 1782, by Mr. John Bell. 35. *C. rhomboidalis*, Linn. Sp. Pl. 10. Lam. Enc. 20. Illuf. 2514. (*C. rhomboidea*: Mart. 11. Willd. 32. *C. caule simplici*, &c.: Hall. helv. n. 693. *C. diabæ minoris folio*: Bauh. p. 94. prod. 93. *Rapunculus Teucrii folio*: Bar. ic. 567. Bocc. Mus. 75. tab. 61.) "Leaves rhomboidal, serrated; spike often unilateral; calyx-segments capillary." *Root* perennial, creeping. *Stems* from six to sixteen inches high, upright, slender, angular, almost smooth. *Leaves* sessile, scattered, with a few short hairs. *Flowers* blue, in a short, loose spike: calyx smooth, with awl-shaped, entire segments. *Capful* small, scarcely three inches long, inversely pyramidal, not egg-shaped, triangular; angles rounded, thick, three-nerved; interstices narrow, depressed; lobes just below the base of the calyx. *Seeds* small, russet, shining. Lam. and Gert. A native of Italy, Switzerland, and the south of France. 36. *C. asteroides*, Lam. Ill. 2515. "Stem angular, rod-like; leaves egg-shaped, acuminate, finely serrated, remote; flowers sessile, axillary and spiked." *Corolla* widely spreading. *Calyx* reflexed. *Style* exserted, ascending. *Stigma* three-cleft. Cultivated by M. le Monnier at Paris; native country unknown. 37. *C. Alpini*, Linn. Sp. Pl. p. 1669. Lam. Enc. 21. Illuf. 2516. (*C. rhomboidea* β.: Willd. Mart. pyramidalis minor: Alp. exot. 340.) "Leaves lanceolate, serrated; lower ones petioled; upper ones sessile: flowers nodding: style exserted." Lam. *Root* perennial. Larger and more branched than *C. rhomboidalis*, and distinguished from it by its petioled lower leaves and long style. A native of Italy near Bassano. 38. *C. crispa*, Lam. Enc. 22. Ill. 2517. (*C. orientalis foli-*

orum crenis amplioribus: Tourn. Cor. 3.) "Leaves even, petioled, somewhat heart-shaped, doubly serrated, gashed: stem simple: flowers lateral and terminal, spreading." *Stems* three or four, about a foot high, simple, round, smooth, rather thick. *Leaves* curled; lower ones interruptedly decurrent on long petioles. *Flowers* on short peduncles; in an upright, long, leafy spike: corolla short, very open; with five oval, rather acute segments: stigma five-cleft. Found by Tournefort in Armenia; described by La Marck from a specimen in the Herbarium of Jussieu, and from an original drawing by Aubriet. 39. *C. ensifolia*, Lam. Enc. 23. Ill. 2518. Willd. 31. "Stem shrubby: leaves sword-shaped, serrated, smooth: flowers paniced, nodding." *Stem* in its lower part woody, simple or occasionally a little branched, scarred with the marks of fallen leaves, and crowned with numerous close-set leaves in a rosaceous form, which are from two to three inches long, and from four to five lines broad, similar to those of Yucca or Pandanus, and striated with longitudinal nerves. From the midit of these leaves rises a smooth stem about six inches high, clothed with alternate, sessile leaves, resembling those below, but smaller. From the axil of each stem-leaf springs a short one-flowered branch furnished with one or two small leaves, which give the whole a paniced appearance. *Flowers* drooping: calyx smooth. Found by Commerçon on the Volcano in the isle of Bourbon. 40. *C. aurea*, Linn. jun. Supp. p. 141. Willd. 68. Mart. 18. Lam. Enc. p. 590. Ill. 2519. "Capsules five-celled: leaves elliptical, doubly serrated, smooth: flowers somewhat paniced: stem, shrubby, fleshy." *Root* perennial. *Stems* growing close to the rocks. *Calyx* coloured. Tube of the corolla distinct from the calyx: segments of the border reflexed. *Stigma* five-cleft. Discovered in the island of Madeira by Masson, and introduced at Kew in 1777. 41. *C. verticillata*, Linn. jun. Supp. p. 141. Willd. 11. Mart. 61. Lam. Enc. 24. Ill. 2520. Pallas it. vol. iii. p. 719. tab. g* fig. 1. German edition, vol. iv. p. 376. tab. 34. French Translation. "Leaves five or six in a whorl, lanceolate, serrated: flowers in whorls." *Root* perennial, thick. *Stems* numerous, about a foot high, erect. *Leaves* about six in a whorl, nearly upright, stiff, strongly nerved. *Flowers* blue, on the upper part of the stem above the whorls of leaves, drooping, many in a whorl, on short peduncles: whorls about five, distant from each other: bracts awl-shaped, rather ascending: calyx small, with bristle-shaped segments: style almost twice the length of the corolla. A native of Dauria. 42. *C. Zeyssii*, Willd. 5. Lam. Ill. 2521. Jacq. ic. 2. tab. 334. Hort. Syn. 105. "Stems tufted, few-flowered: leaves smooth, very entire; root-leaves petioled, roundish egg-shaped; stem-leaves oblong-inversely egg-shaped, sessile." *Root* perennial. *Stems* two or three inches high. *Corolla* cylindrical, nodding: orifice bearded. A native of rocky mountains in Austria. 43. *C. tenella*, Linn. jun. Supp. p. 141. Willd. 79. Mart. 19. Lam. Enc. p. 390. Ill. 2522. Thunb. Prod. (*Lobelia tenella*: Linn. Mant. 120. Syst. Nat. 28. *Lightfootia oxycoccoides*: P'Herit. Sert. Ang. tab. 4.) "Stems diffuse, thread-shaped: leaves egg-shaped, generally with one tooth, reflexed: flowers solitary, terminal." *Root* perennial. *Stems* five or six inches long, regularly branched; branches simple. *Leaves* small, crowded, sessile, glossy, obtuse, channelled. *Flowers* small, few, lateral, on short peduncles near the summit of the branches: calyx glossy; segments acute: corolla five-cleft. Found at the Cape of Good Hope by Thunberg and Sonnerat. 44. *C. sessiliflora*, Linn. jun. Supp. p. 139. Willd. 21. Mart. 57. Lam. Enc. p. 590. (*Lightfootia subulata* P'Heritier fert. tab. 5. ?.) "Stem prostrate; leaves linear-

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linear-awl-shaped, entire; flowers axillary, solitary, sessile." Found by Thunberg at the Cape of Good Hope. 45. *C. fasciculata*, Linn. jun. Supp. p. 139. Willd. 25. Mart. 58. Lam. Enc. p. 590. Ill. 2524. "Stem shrubby; leaves small, egg shaped, with one or two teeth, recurved; flowers glomerated, terminal." Found by Thunberg and Sonnerat at the Cape of Good Hope. 46. *C. Lobeloides*, Linn. jun. Supp. p. 140. Willd. 17. Mart. 15. Lam. Enc. p. 590. Ill. 2525. "Stems round, stiff, and smooth; leaves linear-lanceolate, toothed; corolla funnel-shaped." Root annual. Stems much branched. Leaves sessile. Flowers very small, pale purple; calyx with three or five egg-shaped, obtuse divisions; corolla twice as long as the calyx; tube round, gradually widened; segments of the border three or five, erect; stamens three or five. Capsule two-celled. In general habit, tenderness, mode of division and inflorescence it resembles a Lobelia, Linn. jun. Found by Masson in the island of Madeira; introduced into England in 1777. 47. *C. porosa*, Linn. jun. Supp. p. 142. Willd. 18. Mart. 20. La Marck Enc. p. 590. Thunb. prod. 39. "Root-leaves inversely egg-shaped; stem-leaves lanceolate; stem rough, with points; flowers in racemes." This plant is distinguished by the minute pores on the stem, which are directed not downwards but upwards. Stem about a foot high, round; branches numerous, upright, short. Flowers small, a little nodding; calyx half the length of the corolla, even; segments lanceolate. 48. *C. undulata*, Linn. jun. Supp. p. 142. Willd. 19. Mart. 21. Lam. Enc. 590. "Leaves lanceolate, toothed, waved; flowers nearly solitary, peduncled." Stem a foot and half high, upright, slender, smooth, a little branched near the top. Leaves sessile, a little decurrent, reflexed at the edges, repand, nearly even. Flowers the size of those of *rotundifolia*; calyx even; segments short, acuminate. 49. *C. capillacea*, Linn. jun. Supp. p. 139. Martyn 13. "Herbaceous, upright; leaves thread-shaped, smooth; panicle terminal; flowers alternate; capsules smooth." 50. *C. linearis*, Linn. jun. Supp. p. 140. Willd. 20. Mart. 14. "Herbaceous, upright; leaves linear, entire, smooth; flowers drooping; calyx the length of the corolla; capsule hispid." 51. *C. unidentata*, Linn. jun. Supp. p. 139. Willd. 24. Mart. 12. "Stems upright, simple, smooth; leaves lanceolate, smooth, with one tooth on each side; panicle divaricated, leafy." 52. *C. adpressa*, Linn. jun. Supp. p. 139. Willd. 47. Mart. 60. "Stem herbaceous, upright; leaves lanceolate, toothed, recurved, ciliated at the base, pressed close to the stem; panicle twice compound." 53. *C. procumbens*, Linn. jun. Supp. p. 141. Willd. 78. Mart. 62. "Stem dichotomous, diffused; leaves inversely-egg-shaped, scolloped, obtuse; flowers solitary, erect." 54. *C. cinerea*, Linn. jun. Supp. p. 139. Willd. 51. Mart. 26. Thun. Prod. 38. "Leaves lanceolate, waved, hairy, entire; stem angular, hispid; flowers in racemes." The last eight were found by Thunberg at the Cape of Good Hope. 55. *C. triphylla*, Willd. 10. Mart. 63. Thunberg, flor. jap. 87. "Leaves by threes, linear; flowers by threes in whorls." Root perennial, spindle-shaped. Stem herbaceous, erect, smooth. Leaves an inch long, sessile, acute, entire, reflexed at the edge, expanding, smooth. Flowers axillary, peduncled; peduncles capillary, seldom more than one flowered, three times the length of the leaves. 56. *C. tetraphylla*, Willd. 9. Mart. 64. Thunb. flor. jap. 87. "Leaves by fours, oblong, serrated." Stem two feet high, obscurely angular, jointed, smooth, simple at bottom, panicked at top; branches four, opposite and alternate, wand-like, diffused, obscurely quadrangular, smooth; the upper ones shorter, capillary. Leaves an inch or more long, the length of the internodes, sessile, attenuated

towards the base, acute, smooth, erect; green above, pale beneath, with a strong midrib. Flowers on the branches numerous, drooping, on capillary peduncles; bractes bristle-shaped, smooth; corolla whitish; anthers linear; style double the length of the corolla, stigma trifid.

† Leaves harsh to the touch.

57. *C. glauca*, Willd. 7. Mart. 65. Thunb. flor. jap. 88. "Leaves sessile, egg shaped, serrated, glaucous beneath; stem angular, panicked; peduncles one-flowered." An under-shrub. Stem two feet high, erect, smooth; branches erect, zigzag, somewhat fastigiate, angular, smooth. Leaves scattered, acute, a little reflexed at the edge, scabrous, netted; lower ones larger, expanding, upper gradually less, erect, about an inch long. Flowers axillary on the upper part of the branches; peduncles an inch long, erect; bractes one or two on a peduncle, alternate, lanceolate, resembling the leaves; calyx somewhat angular, glaucous; segments lanceolate, reflexed; corolla large, blue. 58. *C. marginata*, Willd. 44. Mart. 66. Thun. jap. 89. "Leaves lanceolate, waved, serrated, bordered; branches weak; flowers terminal, solitary." Stem thick at the base, rather woody, decumbent; branches numerous, about seven inches long, capillary, rather erect, a little subdivided, striated, smooth. Leaves on the lower part of the branches half an inch long, sessile, alternate, white edged, hispid with white hairs. Flowers terminal, solitary. The last four were observed by Thunberg in Japan. 59. *C. paniculata*, Linn. jun. Supp. p. 139. Willd. 50. Mart. 59. Thunb. Prod. 39. "Leaves lanceolate, waved, hairy; stem angular, hispid; flowers in racemes." Stem herbaceous, panicked; branches divaricated. Leaves entire. A native of the Cape of Good Hope. 60. *C. latifolia*, Giant throat-wort, Linn. Sp. Pl. 11. Willd. 33. Mart. 22. Lam. Enc. 25. Ill. 2526. Eng. Bot. 302. "Leaves egg-lanceolate; stem quite simple, nearly round; flowers solitary, peduncled; calyxes smooth; fruit drooping." Root perennial, milky. Stem three or four feet high, erect, slightly angular, somewhat hispid, many-flowered. Leaves large, alternate, nearly sessile, roughish, doubly serrated. Flowers large, blue, sometimes white, axillary, almost always solitary, erect; calyx smooth, serrated. A native of Sweden, Switzerland, and other parts of Europe; common in Scotland and the north of England, rare in the south. It is sometimes cultivated in gardens. 61. *C. urticifolia*, Willd. 34. Schmidt. 173. "Stem angular, hispid; upper leaves egg-lanceolate, coarsely serrated; peduncles one-flowered, axillary, drooping; calyxes hispid." It differs from the preceding, chiefly in its hispid calyxes; but its stem is also more hispid, and has more prominent angles; its root and lower stem-leaves are also heart-shaped, and in that respect approach more nearly to *C. trachelium*. A native of shady places in Germany and Bohemia. The *urticifolia* of Allioni (flor. pedem. n. 406.) taken up by Professor Martyn n. 72., seems a different plant, which ought to be placed with a new specific name in the preceding subdivision. It is thus characterized: "Stem roundish, simple, upper leaves sessile; spike unilateral; peduncles one-flowered; calyxes smooth." Plant entirely smooth. Stem three feet high, streaked. Leaves soft, egg-lanceolate, unequally and sharply toothed. Flowers single, axillary, on short peduncles towards the top of the stem, with linear bractes; calyx five-cleft beyond the middle; segments narrow, not reflexed; corolla and calyx nearly equal. A native of Italy in woods. After all, the plants of Schmidt and Allioni are nearly allied to each other, and seem to differ chiefly in the comparative length of the calyx and corolla. Both of them may, perhaps, be not improperly considered as varieties of *C. latifolia*. Characters drawn

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drawn from the smoothness or roughness of the leaves, though they often afford a good and always an obvious distinction, and on that account make convenient subdivisions in a large genus, are sometimes fallacious, and can seldom be opposed to each other with rigid exactness. 62. *C. Trachelium*, nettle-leaved throat-wort, Linn. Sp. Pl. 16. Willd. 41. Mart. 28. Lam. Enc. 26. Ill. 2527. Eng. Bot. 12. "Stem angular; leaves lanceolate-heart-shaped, acutely serrated; calyxes hispid; peduncles axillary, few-flowered." Root perennial. Stem two or three feet high, stiff, hispid. Leaves petioled, deeply and unequally serrated, harshly rough, generally hispid with pungent bristles. Flowers violet-coloured, rather less than those of *C. latifolia*; sometimes three, but more frequently only one on a peduncle; calyx hispid at the base and on the edge, but sometimes smooth. A native of many parts of Europe; common in the south, but rare in the north of England. 63. *C. rapunculoides*, Linn. Sp. Pl. 12. Willd. 36. Mart. 23. Lam. Enc. 27. Ill. 2528. Eng. Bot. 1369. "Leaves lanceolate-heart-shaped; stem branched; flowers scattered, unilateral, nodding; calyxes reflexed." Root perennial, creeping. Stem about a foot high, more or less branched, round, rough with deflexed hairs. Leaves scabrous; lower ones petioled, lower ones sessile. Flowers blue, axillary. Capsule resembling that of *Rapunculus*, but only half as large. Segments of the calyx linear, reflexed. Openings large at the very base of the capsule. Seeds elliptical, so much compressed as to be almost flat, plain on one side, marked with an elevated longitudinal line on the other, of a yellowish bay colour, scarcely shining. Gært. A native of Switzerland, France, and Austria; rare in great Britain, but, as appears from Buddle's herbarium, gathered among yew trees in some woods in Oxfordshire, and found, apparently wild, by Dr. Skrimshire at Blair in Scotland. 64. *C. bononiensis*, Linn. Sp. Pl. 13. Willd. 37. Mart. 24. Lam. Enc. 28. Ill. 2529. "Leaves egg-lanceolate, scabrous beneath, sessile; stem panicled." Root perennial, large, woody. Stem with the habit of *verbascum nigrum*, three feet high or more, erect, rough. Leaves sessile, almost heart-shaped, slightly toothed, covered with white hairs beneath. Flowers violet-colour, terminating the branches in a kind of spike, axillary; lower ones three together, on short peduncles; upper ones single, sometimes two, sessile. A native of Italy, Carniola, Switzerland; introduced into England in 1773 by John Earl of Bute. 65. *C. graminifolia*, Linn. Sp. 14. Willd. 40. Mart. 25. Lam. Enc. 29. Ill. 2530. "Leaves linear-awl shaped; head terminal." Root perennial, divided at the crown into several trunks, each producing a tuft of straight, long, grass-like leaves, ciliated at their base. Stems simple, scarcely longer than the root-leaves. Stem-leaves alternate, rather embracing the stem. Flowers blue, five or seven together, in a head; bractes egg-shaped, acuminate; stigma two-cleft. 66. *C. glomerata*, little Canterbury bells, Linn. Sp. Pl. 17. Willd. 42. Mart. 29. Lam. Enc. 30. Ill. 2531. Eng. Bot. 90. "Stem angular, simple; flowers sessile; most of them collected into a head, a few solitary, and axillary within the upper leaves; leaves egg-shaped, scolloped." Root perennial, woody. Stem a foot high, erect, roundish, rather rough, seldom if ever branched, unless first eaten down by cattle. Leaves hairy, pale beneath; root-leaves a little heart-shaped, on long petioles; stem-leaves half embracing the stem. Flowers blue, purple, or white. A native of lime-stone and chalky soils in England, France, and other parts of Europe. 67. *C. petraea*, Linn. Sp. Pl. 20. Willd. 46. Mart. 32. Lam. Enc. 31. Ill. 2532. Bar. ic. 890. (*Trachelium majus petraeum*; Pon. bald. 161.) "Stems simple, rough; leaves oblong-egg-shaped, hairy, sessile;

head terminal." Nearly allied to the preceding, but more hairy. Stem one or two feet high, erect, rough. Leaves all oblong, harsh, deep green above, whitish and cottony beneath; stem-leaves not half embracing the stem. Found first by Pona on mount Baldo: a native also of Piedmont, Silesia, &c. 68. *C. Cervicaria*, Linn. Sp. Pl. 18. Willd. 43. Mart. 30. Lam. Enc. 32. Ill. 2533. "Hispid; flowers sessile; head terminal; leaves lanceolate-linear, waved, scolloped." Root biennial, esculent. Stem about a foot high, simple, or a little branched. Leaves straight, almost linear, rough with hairs. Flowers blue or white, most of them in a head, a few axillary. A native of woods on the continent of Europe; introduced into England in 1783 by Dr. Pitcairn. 69. *C. thyrsoides*, Linn. Sp. 19. Willd. 45. Mart. 31. Lam. Enc. 33. Ill. 2534. "Hispid; raceme oblong-egg-shaped, terminal; stem quite simple; leaves lanceolate-linear." Root biennial, large, woody. Stem eight or ten inches high, erect, rough with white hairs. Root leaves tufted, rough, lanceolate-egg-shaped. Stem-leaves numerous, upright, scattered, hairy, a little harsh to the touch. Flowers yellowish white, very numerous, densely disposed in a kind of thyrs; corolla hairy. A native of Austria, Switzerland, and the south of France. 70. *C. lanuginosa*, Lam. Enc. 34. Ill. 2535. (*C. peregrina*: Linn. Mant. Willd. 52?) "Hispid-lanuginous: leaves egg-shaped, wrinkled, scolloped, narrowing into a petiole: stem simple; flowers nearly sessile, erect, open." Stem a foot high, erect, round, thickly covered with separate white hairs. Root-leaves rough on both sides, pale green above, whitish beneath, a little resembling those of the primrose: stem-leaves smaller, alternate; the upper ones sessile and rather acute. Flowers lateral and terminal, solitary, blue: calyx hispid, a little shorter than the corolla; segments lanceolate: corolla short, very open: style not longer than the corolla: stigma three cleft. Cultivated for a long time in the royal garden at Paris, and supposed to be a native of Tartary. The peregrina of Linnaeus sprang up in ground sown with seeds from the Cape of Good Hope, but it was probably mixed with them by accident. 71. *C. tomentosa*, Lam. Enc. 35. Ill. 2536. (*C. foliis profunde incisiss, tomentosa tota & incana*, Tourn. Cor. 3.) "Root-leaves long, spatula-shaped, scolloped; upper ones wedge-shaped; flowers peduncled, somewhat spiked; calyx downy." The whole plant covered with a fine white down. Stem round. Flowers oblong, in a loose, sometimes unilateral spike, on short peduncles; calyx half the length of the corolla. Described by La Marck from a dried specimen in the herbarium of Jussieu. Native country unknown. 72. *C. argentea*, Lam. Enc. 36. Ill. 2537. (*C. leucoli folio*: Tourn. Cor. 3.) "Leaves oblong, narrow, silvery-white with down; stem panicled: branches one-flowered." Stem three or four inches high. Root-leaves numerous, a little enlarged towards their summit, scarcely an inch long, entire. Stem-leaves almost linear. Flowers terminal. A native of Armenia, preserved in the herbarium of Jussieu. 73. *C. calaminthifolia*, Lam. Enc. 37. Ill. 2538. (*C. saxatilis, foliis crenatis & veluti rugosis*: Tourn. Cor. 3.) "Pubescent: stem branched, decumbent: stem-leaves roundish egg-shaped, scolloped, nearly sessile; those on the branches small, acute: corolla pubescent on the outside." Stem scarcely a foot long. Stem leaves spatula-shaped, like those of the daisy. Flowers terminating and axillary: corolla a little tubular. Found by Tournefort in the island of Naxos; described from a dried specimen in the herbarium of Jussieu, and an original drawing by Aubriet. 74. *C. hispidula*, Linn. jun. Supp. p. 142. Willd. 49. Mart. 27. Lam. Enc. 40. Ill. 2542. "Hispid: flowers erect; calyx the length of the corolla." Root annual. Stem about four inches high, branched, especially

cially near the top. *Leaves* alternate, linear, acuminate, ciliated, especially the midrib. *Flowers* nearly sessile, terminal: segments of the calyx linear, ciliated: corolla funnel-shaped: stigma three-cleft. A native of the Cape of Good Hope. 75. *C. capensis*, Linn. Sp. Pl. 36. Willd. 77. Mart. 51. Lam. Ill. 2543. Bot. Mag. 782. "Leaves lanceolate, toothed, hispid; peduncles very long: capsules beset with stiff hairs." *Root* annual. *Stem* round, hairy, branched. *Leaves* waved, opposite below, scattered near the top. *Flowers* blue, nodding: segments of the calyx linear-lanceolate, entire, spreading: corolla funnel-shaped; tube short, hairy within; segments of the border egg-shaped, acute: stigma five-cleft; segments petal-like, egg-shaped, spreading, deep blue, hispid underneath. *Capsule* five-celled, erect, obsoletely ten-angled, opening with five lanceolate valves. *Seeds* flat, shining, numerous. A native of the Cape of Good Hope. 76. *C. cernua*, Willd. 53. Thunb. Prod. 39. "Leaves oblong, waved, hairy: flowers terminal, drooping: calyx smooth." A native of the Cape of Good Hope. 77. *C. erinus*, Linn. Sp. Pl. 40. Willd. 85. Mart. 56. Lam. Enc. 38. Ill. 2544. Læf. it. 127. (*Rapunculus minor*, foliis incis. Bauh. pin.) "Stem dichotomous: leaves sessile; upper ones opposite, three toothed." *Root* annual. *Stem* about six inches high. *Root-leaves* oblong; *stem-leaves* oblong, a little spatula-shaped. *Flowers* pale blue, small. A native of barren places in Italy, Spain, and the South of France. 78. *C. erinoides*, Linn. Mant. p. 44. Willd. 83. Mart. 54. Lam. Enc. 39. Ill. 2545. "Stems diffuse; leaves lanceolate, slightly ferrated, decurrent with a scabrous edge: flowers peduncled, solitary." *Stems* much branched. *Leaves* alternate. *Flowers* terminal, erect; germ not angular: style three-cleft. According to Linnæus it resembles *lobelia erinoides*, and La Marck observes that his only synonym is Herm. Lugd. 100. tab. 11.; with a mark of doubt, the same which he has quoted under *Lobelia erinus* without such mark, and which is also the only one under that species. Professor Martyn considers them as one and the same plant, and has accordingly referred *C. erinoides* to *Lobelia erinus*: but La Marck, notwithstanding his remark in the Encyclopédie Méthodique, has continued *C. erinoides* in his Illustrations. Said to be a native of Africa. 79. *C. repens*, Mart. 78. Loureiro Coch. 139. "Stem subdivided, creeping: leaves oblong, fleshy: flowers solitary." *Stem* herbaceous, much branched. *Leaves* entire, small, hairy, opposite. *Flowers* small, white, sessile, axillary: segments of the calyx acute, upright: segments of the corolla rounded, acuminate: stigma three-cleft. *Capsules* roundish triangular, hairy, three-celled, one-seeded. A native of Cochinchina.

* * Calyx five-cleft: capsules elongated, prism-shaped.

(*Prismatocarpus*: P'Herit. legouisia: Durande.)

80. *C. fruticosa*, Linn. Sp. 30. Willd. 69. Mart. 45. Lam. Enc. 60. Ill. 2569. *C. africana*, ericæ folio Herm. afr. 5. "Capsules five-celled, stem shrubby; leaves linear-awl-shaped: peduncles very long." *Root* perennial. *Flowers* blue, expanded. A native of the Cape of Good Hope. 81. *C. Speculum*, Venus's looking-glass. Linn. Sp. Pl. 31. Willd. 70. Mart. 46. Lam. Enc. 61. Ill. 2570. Bot. Mag. 102. "Stem much branched, diffuse: leaves oblong, slightly scolloped: flowers solitary." *Root* annual. *Stems* from six to ten inches high. *Leaves* small, sessile. *Flowers* purple, inclining to violet, peduncled, terminal, folding up in the evening into a pentagon figure: segments of the calyx linear-lanceolate, acute, the length of the corolla: corolla flat, wheel-shaped, deeply divided; segments egg-shaped: valves of the nectary scarcely discernible. A native of cornfields in the South of Europe; and a common annual in

English gardens, where, when once introduced, it generally sows itself without farther trouble. 82. *C. hybrida*, Linn. Sp. Pl. 32. Willd. 71. Mart. 47. Lam. Enc. 62. Ill. 2571. Eng. Bot. 375. "Stem often branched at the base, stiff, leaves oblong, scolloped, waved; corolla shorter than the calyx." *Root* annual, small, fibrous. *Stem* nearly erect, a little zigzag, angular. *Leaves* alternate, remote, sessile, rough at the edge. *Flowers* small, terminal, solitary, sessile, pale purple: style and stigma club-shaped, hairy. From a comparison of many wild and cultivated specimens of *C. speculum* and *hybrida*, Dr. Smith is persuaded that they are varieties of each other; and that the segments of the calyx in both are very variable in length and breadth, as is also the corolla in size. Linnæus supposed it a mule produced from *C. speculum*, impregnated by some other plant. A native of corn fields on a chalky soil in Cambridgeshire, Norfolk, and Suffolk, and in several parts of the Continent of Europe. 83. *C. Pentagonia*, Linn. Sp. Pl. 34. Willd. 75. Mart. 49. Lam. Enc. 64. Ill. 2572. (*C. thracica*, Tourn. Inst. p. 112. Rai Hist. p. 742. n. 2.) "Stem subdivided, much branched: leaves linear acuminate." *Root* annual, simple, white. *Stem* slender, weak. *Leaves* sessile; lower ones broader. *Flowers* terminal, of a paler blue, twice as large, more concave, and more bell-shaped than those of *C. speculum*, with a corolla less deeply divided. Cultivated by Mr. Ray before 1686, from seed collected in Thrace, by Mr. Covill of Cambridge. La Marck from the inspection of specimens preserved in the herbarium of Jussieu, judges it to be only a variety of *C. hybrida*. 84. *C. perfoliata*, Linn. Sp. Pl. 35. Willd. 76. Mart. 50. Lam. Enc. 65. Ill. 2573. Morif. hist. 2. tab. 2. fig. 3. Barr. rar. 83. tab. 33. Tourn. 112. Rai. hist. 743. 3. "Stem simple: leaves heart-shaped, toothed, embracing the stem: flowers sessile, aggregate." *Root* annual. *Stem* from six inches to a foot and half high, sometimes with one or two branches near the bottom, upright, angular, slightly woolly. *Flowers* blue, small, axillary, three or four together. A native of Virginia. 85. *C. ericoides*, Lam. Ill. 2574. (*C. subulata*, Thunb. Prod. 38? *Polemonium roeloides*, Linn. jun. Supp. 139?) "Stem erect, slender, leaves awl-shaped, tooth-ciliated: panicle naked, few-flowered. 86. *C. Prismatocarpus*, Willd. 72. Mart. 75. Hort. Kew. i. p. 224. (*C. nitida*: Lam. Ill. 275. *Prismatocarpus roeloides*: P'Herit. Sert. 2. tab. 3.) "Stems shrubby at the base: leaves egg-lanceolate, toothed, very smooth: flowers terminal; corolla twice the length of the calyx." *Root* annual. *Stem* decumbent. *Flowers* sessile. *Capsule* linear. A native of the Cape of Good Hope; introduced at Kew in 1787. Willdenow intimates a doubt whether it may not be the same as *C. cernua*, n. 76.

* * * Calyx ten-cleft; five alternate segments reflexed, covering the capsule.

87. *C. nana*, Lam. Enc. 41. Ill. 2546. "Stem one-flowered: root-leaves inversely egg-shaped, ciliated, rugged: stem-leaves lanceolate, a little toothed: calyx hispid." *Stem* two or three inches high. *Stem-leaves* two, alternate, slightly hairy. *Flower* large, terminal, upright: border sometimes a little bearded: segments of the calyx lanceolate, straight, expanding. Cultivated in the royal garden at Paris, and supposed to be a native of the Alps. It differs from *C. cernua* chiefly in its calyx. 88. *C. ligularis*, Lam. Enc. 42. Ill. 2547. "Stem one-flowered: root-leaves spatula-shaped: stem-leaves strap-shaped, entire: flower erect." *Stem* three inches high, upright, slender, nearly smooth. *Stem-leaves* numerous, alternate, slightly ciliated. *Flower* terminal, upright, tubular, bell-shaped, a little bearded: calyx hispid; segments almost linear. Cultivated in the royal garden at Paris, and supposed to be a native of the Alps.

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Alps. 89. *C. barbata*, Linn. Sp. Pl. 22. Willd. 57. Mart. 35. Lam. Enc. 48. Ill. 2548. "Capsules five-celled: stem generally few-flowered: leaves lanceolate: corolla bearded." Root said by some authors to be perennial, by others biennial. Stem simple, from six to eighteen inches high, hairy. Root-leaves from five to ten, bluntish, obscurely scolloped, rather rugged, narrowing into flat petioles. Stem-leaves few, sessile. Flowers blue or white, peduncled, commonly drooping, few, unilateral: calyx hispid: smoothish on the outside, bearded within with long white hairs. According to Scopoli, it varies with one, two, three, or four, and sometimes with a greater number of flowers. According to Haller the capsule is five-angled, but only three-celled. A native of the Alps and other mountains in Europe. 90. *C. alpestris*, Mart. 73. Allion. Ped. 2. 418. tab. 6. fig. 3. (*C. Allionii*, Willd. 54. Vill. delph. 2. tab. 10. *C. trilobularis*, Turr. fl. ital. Prod. p. 64. n. 10.) "Stem simple, generally one-flowered, hispid: leaves linear-lanceolate, waved, hispid." Root perennial, creeping. Stems numerous, two or three inches high. Root-leaves of the first year small, blunt, almost round; succeeding ones longer: bottom stem-leaves still longer, acute, all roughish and ciliated. Haller considers it as a variety of the preceding; but Allioni and Villars pronounce it to be distinct. A native of the Alps. 91. *C. dichotoma*, Linn. Sp. Pl. 24. Mart. 33. Lam. Enc. 43. Ill. 2549. (*C. mollis*, β . Willd.) "Capsules five-celled: stem forked: flowers drooping." Root annual. Stem near a foot high, rather slender, slightly hispid; branches spreading. Leaves sessile, lanceolate-egg-shaped, scabrous, distant, alternate, often opposite under the forks of the stem. Flowers bluish, solitary, terminal, and in the forks of the branches, on short peduncles: calyx hispid; segments egg-shaped-acuminate. Lam. A native of Sicily and the Levant. 92. *C. mollis*, Linn. Sp. Pl. 25. Willd. 61. Mart. 38. Lam. Ill. 2550. Bot. Mag. 404. (*dichotoma* β . Enc.) "Capsules five-celled, peduncled: stem prostrate: leaves nearly round." Stems decumbent, a little branched, rather stiff, hairy. Leaves small, sessile, nearly entire, cottony. Flowers axillary, solitary, on long petioles, six times larger than the leaves: calyx large, naked, Linn. A native of Spain and the Levant. 93. *C. Medium*, Linn. Sp. Pl. 21. Willd. 56. Mart. 34. Lam. Enc. 44. Ill. 2551. Coventry or Canterbury bells. "Capsules five-celled; stem upright; flowers upright." Root biennial. Stem two feet high, round, furrowed, hairy, rugged a little branched. Root-leaves narrowed at the base, into long petioles slightly scolloped, hairy, harsh to the touch. Stem-leaves oblong, sessile, scolloped. Flowers blue, purple or white, large: segments of the corolla shallow, reflexed: stigma five-cleft. Capsule entirely covered by the reflexed segments of the calyx. A native of woods on the Continent of Europe; common in English gardens, where it was cultivated in 1597. 94. *C. punctata*, Willd. 55. Lam. Enc. 45. Ill. 2552. Gmel. Sib. 3. p. 155. tab. 30. "Capsules three-celled; stem simple, upright: flower nodding." Stem about a foot high. Root-leaves petioled, egg-shaped, acuminate, serrated, hairy on both sides, whitish beneath. Stem-leaves alternate, lanceolate, attenuated at the base into short petioles. Flowers at the top of the stem, on short peduncles; corolla whitish without, hairy within, and marked with purple spots. A native of Siberia. 95. *C. pelvisiformis*, Lam. Enc. 46. Illust. 2553. Tourn. Cor. 3. "Capsules five-celled, root-leaves egg-shaped, serrated, petioled; stem-leaves nearly sessile; flower large, basin-shaped." Root large, about a foot long, fibrous, whitish. Stems numerous, six or seven inches long, generally simple, hairy, decumbent. Leaves hairy. Flower solitary, terminal, pale blue; corolla short, a little swelling, slightly hispid at its

angles and edges. Found by Tournefort in the island of Candia; described by La Marck, from a dried specimen in the herbarium of Jussieu, an original drawing by Aubriet and the MSS. of Tournefort. 96. *C. tubulosa*, Lam. Enc. 47. Ill. 2554. (*C. cretica caulibus supinis*, flore oblongo, Tourn. Cor. 3.) "Root-leaves petioled, egg-shaped, unequally toothed, gashed at the base; stem-leaves oblong, serrated, sessile; flower oblong." Allied to *C. dichotoma*. Stems numerous, slender, procumbent, scarcely a foot long, hairy, reddish, branched. Flowers blue, solitary, terminal, upright; calyx half the length of the corolla; corolla tubular. Lam. Found by Tournefort in the isle of Candia. 97. *C. spicata*, Linn. Sp. Pl. 15. Willd. 58. Mart. 36. Lam. Enc. 49. Ill. 2555. "Hispid; spike loose, flowers alternate; leaves linear, entire." The whole plant hairy in all its parts. Root biennial. Stem simple, four or five feet high. Stem-leaves half embracing the stem. Flowers blue, sessile, axillary, from one to three in each axil, forming a long spike, resembling that of *Viper's bugloss*. A native of the Vallais, Dauphiné, and Allace. 98. *C. speciosa*, Lam. Ill. 2556. Pourret. chlor. nar. 13. "Hispid; leaves linear, tooth-scolloped; root-leaves very long; flowers somewhat panicled, nodding." A native of the South of France. 99. *C. alpina*, Linn. Sp. Pl. 1659. Willd. 60. Mart. 37. Lam. Enc. 50. Ill. 2557. Jacq. vin. 210. Aust. 2. tab. 118. Hall. helv. 695. "Stem simple; peduncles one-flowered, axillary, with two bractes." Root perennial. Stem about seven inches high, smooth. Root-leaves linear-oblong, growing wider towards the top, blunt, entire, hairy. Stem-leaves strap-shaped, smaller, sessile. Flowers blue, upright; stigma trifid. Capsule roundish, three-celled. Seeds brownish, with a membranous edge. A native of the Alps, and of mountains in Austria and Silesia. 100. *C. saxatilis*, Linn. Sp. Pl. 26. Willd. 62. Mart. 39. Lam. Enc. 51. Ill. 2558. (*C. cretica saxatilis, bellidis fol.* Tourn. Inst. p. 111. Barr. rar. 79. tab. 813. Bocc. mus. 2. tab. 64.) "Capsules five-keeled; flowers alternate, nodding; leaves inversely egg-shaped, scolloped. Stems from four inches to a foot high. Root-leaves spatula-shaped, two inches long, smooth, rather fleshy, slightly toothed. Flowers blue, hairy within. Capsules hemispherical, five-celled. A native of the isle of Candia. 101. *C. alliarisefolia*, Willd. 63. (*C. orientalis Alliarisefol.* Tourn. Cor. 3.) "Root-leaves kidney shaped, doubly toothed: stem-leaves egg-shaped, toothed, sessile." Root-leaves large, rather rough, on long petioles; stem-leaves small; flowers nodding. A native of the Levant. 102. *C. flirica*, Willd. 64. Mart. 40. Lam. Enc. 52. Ill. 2559. Gmel. Sib. 3. tab. 29. Jacq. Anst. tab. 200. Bot. Mag. 659. "Capsules three-celled; stem panicled." Root biennial. Stem a foot high, upright, angular, slightly hispid, divided only at the top into a loose panicle. Leaves oblong, almost linear, half embracing the stem, rough and commonly waved at their edges. Flowers small, oblong; capsules hispid; peduncles often three-flowered. A native of Siberia, Austria, and Piedmont; introduced by Dr. W. Pitcairn in 1783. 103. *C. violifolia*, Lam. Enc. 53. Ill. 2560. "Capsules covered; root-leaves heart-shaped, scolloped, petioled; flowers large, peduncled; calyx hispid." Root small, fibrous. Stem three or four inches high. Root-leaves a little hairy beneath, and on their petioles, resembling those of *Viola canina*. Stem-leaves alternate, oblong-oval, toothed on short petioles. Flowers two or three; corolla a little bearded; segments shallow; calyx-segments lanceolate. Introduced into the royal garden at Paris in 1765, and supposed to be a native of Siberia. Lam. in his Illustrations expresses a doubt, whether it may not be *C. carpatica* of Jacq. hort. 1. tab. 57. quoted as a

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synonym to our *carpatica*, n. 33. We have not Jacquin's work at hand, but this plant cannot be the *carpatica* of the English gardens figured in the Botanical Magazine, which has a five-cleft calyx, with the segments a little reflexed, but not alternate ones, covering the calyx as in all the species of this division; whereas La Marck describes the calyx of his *violæfolia* to be, à cinq decoupures lanceolées, et à sinus reflexes, the expression by which he uniformly denotes what we call the five alternate reflexed segments. Has he been led into an error by the ambiguous phrase *calyce reflexo* in the definition of the younger Linnæus? If so, the present species must be expunged. He appears to have formed his description only from a dried specimen in the herbarium of Jussieu. 104. *C. heterophylla*, Linn. Sp. Pl. 39. Willd. 84. Mart. 55. Lam. Enc. 54. Ill. 2561. (*C. saxatilis*, foliis inferioribus Bellidis, cæteris Nummulariæ, Tourn. Cor. 3. It. 1. tab. 243.) "Leaves inversely egg-shaped, smooth, entire; stems spreading." Root perennial, white, sweet and full of milk. Stem slender, feeble, generally simple. Root-leaves spatula-shaped, narrowed into petioles, dark green, shining. Stem-leaves numerous, small, roundish, acute, fleshy, bright green, on short petioles, entire. Flowers clear blue, small, axillary and terminal, on short peduncles. A native of the Levant. 105. *C. tridentata*, Linn. Mant. p. 44. Willd. 65. Mart. 41. Lam. Enc. 55. Ill. 2562. Schreb. dec. 3. tab. 2. (*C. orientalis pumila*; Tourn. Cor. 3.) "Capsule five-celled; stem one-flowered; root-leaves three-toothed." Stem twice as long as the root-leaves. Root-leaves like those of *Statice reticulata*, lanceolate, wedge-shaped, often with three teeth near the summit; stem-leaves linear. Flower large, upright, solitary. A native of the Levant. 106. *C. parvifolia*, Lam. Enc. 56. Ill. 2564. (*C. orientalis*, foliis incis, Tourn. Cor. 4.) "Stem branched near the top; root-leaves inversely egg-shaped, scolloped, on long petioles. Stem-leaves lanceolate-egg-shaped, attenuated and gashed at the base; flowers pancelled." Stem about a foot high, round, slightly pubescent. Flowers small, numerous, in terminal panicles. A native of the Levant. 107. *C. lyrata*, Lam. Enc. 57. Ill. 2564. (*C. foliis profunde incis; fructu duro*, Tourn. Cor. 3.) "Hispid; root-leaves lyre-shaped, on long petioles; terminal lobe heart-shaped, scolloped; flowers lateral and terminal, nearly sessile." Stem-leaves sessile, egg-shaped, narrowed at both extremities, gashed, toothed. Flowers upright. A native of the Levant, confounded by Linnæus with the following. 108. *C. laciniata*, Linn. Sp. 27. Willd. 66. Mart. 42. Lam. Enc. 58. Ill. 2565. (*C. græca saxatilis*, Jacobææ folio. Tourn. Cor. 3. It. 1. p. 99. tab. 99.) The synonyms of Linnæus in Species Plantarum taken from C. Bauhin, Morison, and Rauwolf, belong to *Michauxia campanuloides*. "Capsules peduncled; leaves serrated; root-leaves lyre-shaped; stem-leaves lanceolate." Whole plant smooth. Stem a foot high, branched. Flowers large, terminal and axillary, very open; stigma five cleft. A native of Greece. 109. *C. capitata*, Bot. Mag. 811. "Leaves oblong, obtuse, hispid, embracing the stem; flowers terminal, clustered." Whole plant hispid. Root biennial. Raised by J. Swainston esq. at Twickenham, from seeds brought from Greece by the late Professor Sibthorp. 110. *C. striata*, Linn. Sp. Pl. 28. Willd. 67. Mart. 43. Lam. Enc. 59. Ill. 2566. (*C. orientalis folio longo*; Tourn. Cor. 3.) "Leaves hairy; stem-leaves lanceolate, serrated; stem simple, flowers sessile." Stem a foot and a half high, simple, hairy. Root-leaves heart or egg-shaped, rather oblong, serrated, hairy on both sides, petioled. Stem-leaves alternate, remote, sessile, obtuse, narrowed at the base. Flowers axillary, solitary, upright;

calyx hairy. Linn. A native of Syria and Palestine. 111. *C. edulis*, Lam. Enc. p. 590. Ill. 2567. Forsk. Ægyp. p. 44. n. 46. "Stem hispid, branched; leaves egg-shaped, acute, serrated, sessile." Root thick, esculent, of an agreeable taste. Flowers pale blue, with violet veins, sometimes white; segments of the calyx ciliated. A native of Arabia. 112. *C. strigosa*, Willd. 59. Lam. Ill. 2568. Vahl. Symb. 3. p. 34. "Leaves lanceolate, entire; peduncles axillary, one flowered; stem beset with stiff bristles." Root annual. Flowers nodding; corolla hairy on the outside. A native of the Levant.

Propagation and Culture. Such of the species as come from the Cape must be kept in the dry stove, and treated like the other plants of the same climate; they may generally be increased from cuttings. Most of the others are hardy plants, which bear the open air, and will thrive in almost any situation. Those that are annual are usually sown in the spring, in the borders of the flower garden; but, if sown in the preceding autumn, they will be stronger and flower a month earlier. The perennial ones are easily propagated by parting the roots in autumn, but where this practice is long continued, the plants are apt to degenerate, and at length seldom produce seeds. It is desirable, therefore, to raise a succession from seeds, which will produce plants that are more vigorous, and bear a greater profusion of flowers. The pyramidalis, in particular, is seldom fit to adorn halls and chimneys for two successive seasons. In order to procure good seeds, strong plants should be selected which grow in a warm situation, and which have been screened from great rains at the time when their flowers were fully open. The seeds should be sown in autumn in pots and boxes filled with light undunged earth; and in the winter should be sheltered from severe frosts under a hotbed frame. In summer, they must be kept clear from weeds, and moderately watered in very dry seasons. In September, when the leaves of the plants begin to decay, they should be transplanted into beds of light sandy earth without any mixture of dung, and care should be taken not to break or bruise the roots. They should be set about four inches from each other, and in two years will be strong enough to flower. The Rampion, when it is cultivated for the table, should be sown in a shady border about the latter end of May; and in the course of the summer should undergo three hoeings to cut up the weeds, and thin the plants to the distance of three or four inches. The roots are fit for use in the winter, and will continue good till April. If the seeds are sown too early, the plants are apt to flower the same season, by which the roots are always spoiled. See Martyn's Miller.

CAMPANULA canariensis, (Linn. Sp. Pl. 29.) See *CANARINA Campanula*.

CAMPANULA africana frutescens, (Comm. hort. 2. p. 77. tab. 30.) See *ROELLA ciliata*.

CAMPANULA capitis bone spei foliis articulatis, (Pet. mus. 21. fig. 157.) See *ROELLA reticulata*.

CAMPANULA sphaerocephalus, (Pluk. alm. 77. tab. 152. fig. 6.) See *PHYTEUMA comosa*.

CAMPANULA lutea linifolia, (Lob. ic. 414.) See *LINUM campanulatum*.

CAMPANULA minor frutescens, (Brown. Jam. 166. tab. 14. fig. 1.) See *HAMELIA chrysantha*.

CAMPANULA arborescens, (Brown. Jam. 166.) See *HAMELIA grandiflora*.

CAMPANULA serpillifolia, (C. and J. Bauh. Scheuch. Tourn. Morif. Ray.) See *LINNEA*.

CAMPANULA, in Zoology, a species of *MEDUSA*, found in the Greenland seas, and described by O. Fabricius. The disk

disk is gibbous; border wide, and ciliated; beneath a hairy cross.

This kind preys on the marine onisci, crabs, and other small creatures, and is chiefly observed in autumn. Its body is of a conic orbicular form, with the fringe, and hairy cross of a yellow colour, and sometimes white; beneath hollow and snowy white.

CAMPANULACEÆ, in *Botany*, the fourth order of the ninth class of Jussieu's natural orders, so called from their affinity to the genus *Campanula*. Jussieu gives them the following character. *Calyx* superior, sometimes but rarely half inferior; border divided. *Corolla* inserted on the upper part of the calyx, most frequently regular, generally shrivelling; border divided. *Stamens* inserted under the corolla, as many as its segments, and generally alternating with them, most commonly five; anthers either distinct or united. *Germ* glandular above; style one; stigma either simple, or divided. *Capsule* most commonly five-celled, but in some cases two, five or six-celled, often many-seeded, and generally opening at its sides. *Seeds* fixed to the interior angle of the cells. *Stems* generally herbaceous, but sometimes shrubby; milky. *Leaves* most frequently alternate. *Flowers* distinct, or in a few instances aggregate, and enclosed in a common calyx. Jussieu includes in it, *Ceratoltema*, *Fergesia*, *Mindium*, *Canarina*, *Campanula*, *Trachelium*, *Roella*, *Gefneria*, *Cyphia*, *Scævola*, *Phyteuma*, *Lobelia*, and *Jasione*. According to Ventenat, its genera are *Michauxia*, *Canarina*, *Campanula*, *Trachelium*, *Roella*, *Phyteuma*, *Scævola*, *Goederia*, *Lobelia* and *Jasione*. His *Michauxia* is the *Mindium* of Jussieu.

CAMPBELL, ARCHIBALD, in *Biography*, the descendant of an ancient and noble family in Scotland, was born in the year 1598; and having been educated in the profession of the protestant religion, according to the strictest rules of the church of Scotland, as it was settled immediately after the reformation, he zealously supported that church, and the constitution of his country, according to the ideas which he had formed of its legal establishment. In the earlier period of his life, he avowed his attachment to the king, and was distinguished by marks of royal favour. At the commencement, and during the progress of the rebellion, he seems to have maintained his loyalty; and after the establishment of the commonwealth his country was the last that submitted, and even then, his son did not submit. At length, Argyle himself, who had been created marquis in 1641, was induced, by the pressing circumstances of the times, and the authoritative interference of general Monk, to yield to the ruling powers. After the restoration, he was tried for his compliance, under a charge of treason, and sentenced by the parliament of Scotland to be beheaded. During his trial, he behaved with great firmness and dignity: and on the scaffold manifested the intrepidity of a hero, or rather, as the writer of his life says, the constancy of a Christian, asserting the uprightness of his conduct, and the sincerity of his affection both to king Charles I. and king Charles II. As to his character, Mr. Hume (*Hist.* vol. vi. p. 272.) represents him as a man equally supple and inflexible, cautious and determined, and entirely qualified to make a figure during a factious and turbulent period. *Biog. Brit.*

CAMPBELL, ARCHIBALD, earl of Argyle, son to the former, was educated under his father's eye, in the true principles of loyalty and of the Christian religion, and distinguished himself, in an eminent degree, by his personal character and steady attachment to the royal family. When Charles II. was invited home to receive the crown of the kingdom in 1650, he was constituted colonel of his majesty's foot-guards

by the Scots parliament, which then asserted a kind of sovereign authority; but he declined accepting the office, till he obtained a commission from the king; to whose favour he was recommended by his fidelity and valour in his service, as well as by his affectionate and respectful attention to his person. After his majesty's defeat at Worcester, he adhered inflexibly to the royal cause, nor did he desert it, when the king's affairs were become desperate, and his own were reduced to a similar condition. After having capitulated in 1655, to the victorious forces of the English, in consequence of orders from general Middleton, sanctioned by the king's authority, he determined to live peaceably, though he would never acknowledge either Oliver's or Richard's government; and of course he was obnoxious to persons in power, and imprisoned by them. After the king's restoration, his enemies, jealous of the favour and influence which he was likely to acquire, combined in their attempts to destroy him; and they prevailed with the Scots parliament to imprison him, and to commence a process against him for the crime, styled in their laws, leasing-making, or creating dissension between the king and his subjects, by giving the former false informations. They proceeded so far as to condemn him to lose his head, and to forfeit his whole estate; but the king interposed to prevent the final execution of their purposes. At length, his friends came into power, and he was released from a long and severe imprisonment. He was also soon after restored to his grandfather's title and estate, and part of his father's was ordered to be sold for the payment of his debts. In the subsequent part of this reign, he behaved towards his sovereign with respect and affection; and in his opposition to those measures of the court which he could not approve, he manifested a mild and peaceable disposition. When his majesty thought fit to send his brother, the duke of York, into Scotland, in 1681, a parliament was convened, which, among other laws that were proposed and enacted, passed an act for establishing a test, obliging all who possessed offices, civil, military, or ecclesiastical, to take an oath not to attempt any change in the constitution of church or state. This oath contained several clauses, asserting the king's supremacy, renouncing the covenant, and sanctioning passive obedience, introduced by the courtiers, to which the country party added another clause, of adhering to the protestant religion. The courtiers, however, proposed, that all princes of the blood should be exempted from the obligation of taking this oath. Argyle zealously opposed this exception, intimating, that the sole danger to be dreaded, with regard to the protestant religion, must proceed from the perversion of the royal family. His conduct, on this occasion, excited the indignation of the duke, and exposed him to its fatal consequences.

When the earl of Argyle took this test, which he was obliged to do as a privy counsellor, he did it with an explanation which he submitted to the approbation of his royal highness, and the whole privy-council. The explanation was allowed, and the earl took his seat at the board. However, to his great surprise, he was a few days after committed to prison, and prosecuted for high treason, leasing-making, and perjury. Three out of five judges found him guilty of the two first charges, and a jury of 15 noblemen gave verdict against him. The king's leave was obtained for pronouncing sentence against him, but he ordered the execution of it to be delayed. The earl, having little reason to expect either justice or mercy from his enemies, contrived to make his escape from prison, and arrived safely in London, where the place of his concealment was known at court, though the king would not suffer him to be arrested. In

the mean while, the privy-council of Scotland publicly proclaimed his sentence at the cross, and caused his coat of arms to be reversed and torn. As soon as a convenient opportunity occurred, the earl went over to Holland, and continued there during the remaining part of that reign. Conceiving, probably, that his attainder had entirely dissolved the obligations by which he was bound as a British subject, and considering the government in Scotland as unfettled, before king James II. had taken the coronation oath, he concerted measures with the duke of Monmouth, and passed over to Scotland to assemble his friends: but disappointed in his expectations of support, he was taken prisoner, and beheaded at Edinburgh upon his former unjust sentence, June 30, 1685. Under his misfortunes he manifested great firmness and self-possession; he ate his dinner cheerfully on the day of his death, and, according to his usual custom, slept after it for a quarter of an hour or more very soundly; at the place of execution he made a short, grave, and religious speech; he caused the position of the block to be duly adjusted; and after a solemn declaration, that he forgave all his enemies, he submitted to death with extraordinary resolution and composure. *Biog. Brit.*

CAMPBELL, ARCHIBALD, first duke of Argyle, was the son of the preceding, and a very active promoter of the revolution. He accompanied the prince of Orange to England; was admitted into the convention as earl of Argyle, though his father's attainder was not reversed; and in the Claim of Rights, the sentence against him was declared to be, what it undoubtedly was, "a reproach upon the nation." When it was carried in the Scottish convention, that the crown should be established on the prince and princess of Orange, he was sent from the nobility, together with sir James Montgomery, and sir John Dalrymple, from the barons and boroughs, to offer the crown in the name of the convention, to their majesties, and to tender them the coronation oath. For this and other eminent services, he was admitted a member of the privy-council, and in 1690, made one of the lords of the treasury. He was afterwards appointed a colonel of the Scots horse-guards; and, in 1694, one of the extraordinary lords of session. He was likewise created duke of Argyle, marquis of Kintyre and Lorn, earl of Campbell and Cowell, viscount of Lockow and Glengla, lord of Inverary, Mull, Morvern, and Ferrey, by letters patent, bearing date the 23d of June, 1701. He sent over a regiment to Flanders, for king William's service, the officers of which were of his own name and family, who bravely distinguished themselves through the whole course of the war. *Biog. Brit.*

CAMPBELL, JOHN, second duke of Argyle, and also duke of Greenwich and baron of Chatham, son of the preceding, by Elizabeth daughter of sir Lionel Talmash, was born on the 10th of October, 1678, and betimes devoted to a military life. At the age of 17 years, he was appointed by king William to the command of a regiment of foot, with which he served abroad. In 1703 he succeeded to the honours and estates of his father; and in 1705 he was nominated lord high commissioner to the parliament of Scotland. In 1706 he made a campaign under the duke of Marlborough, and distinguished himself by his courage and conduct on several occasions. On his return to Scotland, he promoted the measure of the Union, and incurred some degree of unpopularity among his countrymen. In the years 1708 and 1709, he performed several important services in his military capacity on the continent; in recompence of which he was, in 1710, installed a knight of the garter. Having joined the tory-party, he was, in the following year, appointed ambassador extraordinary and plenipotentiary to Charles III.

king of Spain, and commander in chief of her majesty's forces in that kingdom. But by illness and want of sufficient support, he was disabled from attempting any enterprise of importance; and, indeed, the peace of Utrecht soon after put an end to hostilities. In 1712 he was appointed commander in chief of all the land forces in Scotland; but as he opposed the measures of the ministry, by resisting the resumption of the grants of crown-lands, by censuring the peace of Utrecht, by remonstrating against the extension of the malt-tax to Scotland, and by supporting a bill for dissolving the union, which he had once zealously promoted, he was deprived of all his employments under the crown. However, on the accession of George I. in 1714, they were restored to him with several additional offices of honour and service. In the rebellion of 1715, he had the command of the king's troops in Scotland; and at length compelled the rebels to abandon Perth, and the pretender to quit the kingdom. From this time his political conduct was fluctuating and versatile; being occasionally in and out of place, sometimes supporting, and sometimes opposing the ministry; at one time condemning, and afterwards defending standing armies. In 1718 he was so much in favour as to be advanced to the dignity of a duke of Great Britain, by the title of duke of Greenwich. He afterwards, at different periods, occupied the posts of lord steward of his majesty's household, master-general of the ordnance, and field-marshal of all his majesty's forces. In 1739 he vigorously opposed the administration of sir Robert Walpole, and was removed from all his places; but regained them in 1741, when that minister was displaced. Some disgust at the political arrangements which then took place, induced him very soon to resign them. A paralytic disorder with which he had been for some years afflicted, terminated his life in September 1743; and he was interred in Westminster Abbey, where a splendid monument, executed by Roubiliac, was erected to his memory, some years after his decease. The titles of duke and earl of Greenwich, and baron of Chatham, became extinct at his death; but his Scottish titles devolved on his brother Archibald, earl of Ila. His memory has been usually honoured with the title of the *great* duke of Argyle; and he has been celebrated in very high terms both by Pope and Thomson. The encomium of the latter, in his *Autumn*, is diffuse: that of the former is more concise:

"Argyle, the state's whole thunder born to wield,
And shake alike the senate and the field."

Epilogue to the Satires, dial. ii.

His character is less favourably sketched by Mr. Macpherson in his "History of Great Britain, vol. ii. p. 601." Careless and eager in his disposition, he neither concealed his resentment nor disguised his designs. With a commanding manner, which stamped his very forwardness with an appearance of authority, he was feared by many, but beloved by none. Brave in his person, but not remarkable for his conduct; he might be considered, in his military capacity, as a bold partizan rather than a judicious commander. In his civil character, his fire degenerated into a violence, that often defeated his views. In his public exhibitions in parliament, he was rather spirited than eloquent; better calculated to terrify his enemies than to support his friends. His great defect was a love of money and emolument, which he could not effectually conceal, with all the efforts of his pride. His chief talent was an address in managing the prejudices of the vulgar. He marked their opinions as they changed, and fell dexterously down with the tide." In private life he is allowed to have been an affectionate husband, and an indulgent master, a liberal friend to the poor.

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poor, and a generous patron of merit in distress. As a strict economist, he took care to maintain the dignity of his rank, without wasting any part of his income in empty pomp, or unnecessary expenses. *Biog. Brit.*

CAMPBELL, ARCHIBALD, third duke of Argyle, was born at Ham-house in England, in 1682, and educated at the university of Glasgow. Although he studied law at Utrecht with a view to the bar, he declined pursuing it, and devoted himself to a military life. But he soon abandoned the army, and determined on acquiring the necessary qualifications for a statesman. Accordingly, he occupied several posts of trust and dignity in Scotland, which we shall not here enumerate. As chancellor of the university of Aberdeen, he laboured to promote the interest of that, as well as of the other universities of Scotland; and he particularly encouraged the school of physic at Edinburgh, which has since acquired such high reputation. He was a man of great natural and acquired endowments, well versed in the laws of his country, eminent for his knowledge of human nature, and possessed of very considerable parliamentary abilities. As he had the chief management of Scots affairs, he was very attentive to promote the trade and manufactures of Scotland, and to forward improvements for the good of the country. He excelled in conversation, and collected one of the most valuable private libraries in Great Britain. At Inverary he built for himself a very magnificent seat. Having retained his faculties in full vigour till his 79th year, he died suddenly in April, 1761; and was succeeded in his titles and the estates of his family by John Campbell, fourth duke of Argyle, son of the honourable John Campbell of Mammere, who was the second son of Archibald, the ninth earl of Argyle. *Biog. Brit.*

CAMPBELL, JOHN, an ingenious writer, was the fourth son of Robert Campbell of Glenlyon, Esq., and was born at Edinburgh in 1708. At the early age of five years, he was brought by his mother to Windsor, where her father resided, and at a suitable age articled to an attorney. But the study of the law not suiting his taste, he devoted himself to a literary life, and in due time engaged in the profession of an author, in which he acquired eminence. His earliest productions are not now known; but in 1736, he published in 2 volumes folio, "The military History of Prince Eugene and the Duke of Marlborough, &c." The reputation which he acquired by this performance, occasioned his being employed in the compilation of the "Ancient Universal History," in which he wrote, besides other parts that are not positively ascertained, the Cosmogony. The first work to which he prefixed his name, was "The Lives of the English Admirals, and other eminent British Seamen," of which 2 volumes were published in 1742; and the two remaining volumes were completed in 1744. This work was so well received, that it passed through three editions in the author's own life-time, and a fourth has been since reprinted under the inspection of Dr. Berkenhout. His curious and entertaining pamphlet, entitled "Hermippus Redivivus, or the Sage's Triumph over old Age and the Grave; wherein a Method is laid down for prolonging the Life and Vigour of Man," was published in 1743. This secret is founded upon an ancient inscription preserved in Reinefius's supplement to Gruter, and consists in inhaling the breath of young females. Campbell's tract had its origin in a foreign publication, which suggested the idea, improved by our author with additional learning, and in a strain of grave irony, which made it doubtful whether he was in jest or earnest. According to his account, indeed, the true key of the work was an imitation of Bayle's manner of writing on a difficult subject, without discovering to which side his own sentiments inclin-

ed. In 1744, he published in 2 volumes folio, a much improved edition of "Harris's Collection of Voyages and Travels," which was very favourably received. The next work in which Mr. Campbell engaged, was the "Biographia Britannica," the publication of which commenced in 1745; and his articles are allowed to constitute the principal merit of the four volumes through which they extend. With regard to the extent of his research, and the variety of information which he communicates, as well as the correct and animated style, generally elegant, though somewhat too diffuse, in which he writes, he surpasses his coadjutors in that comprehensive and useful work. If he errs, it is on the side of candour, and a freedom from party-prejudice, which have sometimes degenerated into a system of universal panegyric or apology. To the benevolence of his temper, and in some cases to his superior knowledge, and not to any intention of flattering or deceiving, this error ought to be ascribed. To Mr. Doddsley's "Preceptor," which appeared in 1748, Mr. Campbell contributed the introduction to chronology, and the discourse on trade and commerce. In 1750, he published the first separate edition of his "Present State of Europe," which became very popular, and which contains, in a moderate compass, a great variety of historical and political information. The next great undertaking, in which our author's abilities and learning were eminently displayed, was "The Modern Universal History," to which he contributed the histories of the Portuguese, Dutch, Spanish, French, Swedish, Danish, and Ostend settlements in the East Indies, and the histories of the kingdoms of Spain, Portugal, Algarve, Navarre, and that of France, from Clovis to the year 1656. As our author had thus distinguished himself in the literary world, the degree of LL. D. was very properly and honourably conferred upon him, in 1754, by the university of Glasgow. During the intervals of his greater labours, several smaller and anonymous works proceeded from his fertile pen. Among these, we may reckon his "Description and History of the new Sugar Islands in the West Indies," which was written upon the conclusion of the peace of Paris, at the request of lord Bute, as a vindication of that peace. This treatise was designed to shew the value and importance of the neutral islands that had been ceded to us by the French. It was presented to his majesty with a MS. dedication. It was probably in recompence of his political services, that he was appointed in 1765 his majesty's agent for the province of Georgia, in North America, which employment he held till his decease.

The last and great work of Dr. Campbell, to which he had devoted many years of his life, was his "Political Survey of Britain," which appeared in 2 vols. 4to. in 1774. In this work, the author's patriotism and the extent of his knowledge were eminently displayed; but though it must be allowed to contain numerous plans and hints of improvement, which duly regarded would contribute to preserve and perpetuate the prosperity of this island, some of its projects are founded on erroneous principles, others are of questionable importance and utility, and the reader, who wishes to acquire a just knowledge of the state of these kingdoms, should consult it with caution. The discussions to which it leads engaged the author in a very extensive correspondence; and he derived from it a very considerable increase of reputation. Dr. Campbell's literary character was highly respected not only in his own country, but in the remotest parts of Europe. To this purpose it may be mentioned, that the empress of Russia, in 1774, condescended to honour him with the present of her picture, drawn in the robes worn in that country in the days of John Basilowitz, grand duke of Muscovy, who was contemporary with:

with queen Elizabeth. In return, the author conveyed to St. Petersburg a set of the "Political Survey of Britain," bound in morocco, highly ornamented, and accompanied with a letter descriptive of the triumphs and felicities of her reign.

As Dr. Campbell's literary engagements allowed of few foreign avocations, his life was sedentary and domestic; but by exercise in his garden and house, and a course of temperance and abstemiousness, he guarded against the inconveniences incident to this kind of life, and enjoyed a good state of health, though his constitution was delicate. His general reputation, and his instructive, cheerful conversation, drew to his house, particularly on a Sunday evening, a great number of literary friends and persons of all ranks and professions, who were desirous of testifying their respect for his merit, and of deriving improvement and pleasure from intercourse with him. His knowledge was far from being restricted to those subjects which employed his pen as an author; but he was well acquainted with mathematics and medicine, with the ancient and modern languages, and with the different parts of sacred literature. His memory was singularly retentive; and he had an uncommon facility in communicating his ideas. The style of his works had been formed upon the model of that of bishop Sprat, and was perspicuous, easy, flowing, and harmonious. "To all these accomplishments of the understanding, he joined the more important virtues of a moral and pious character. His disposition was gentle and humane, and his manners kind and obliging. He was the most tender husband, a most indulgent parent, a kind master, a firm and sincere friend. To his great Creator, he paid the constant and ardent tribute of devotion, duty, and reverence; and in his correspondence he showed that a sense of piety was always nearest his heart." It was our author's custom every day to read one or more portions of scripture in the original, with the ancient versions, and the best commentators before him; and in this way, as appears from his own occasional notes and remarks, he went through the sacred writings a number of times with great thankfulness and advantage. His severe study at length brought on a decline which terminated his life, December 28, 1775, when he had nearly completed the 68th year of his age. Biog. Brit.

CAMPBELL, GEORGE, an eminent metaphysician, divine, and biblical critic, was the youngest son of Mr. Colin Campbell, one of the ministers of Aberdeen, and born in that city, December the 25th, 1719. Although he had the misfortune to lose his father at an early age, he made a considerable proficiency in the Latin and Greek classics at the grammar school, and Marischal college of his native place. It was his original intention to follow the profession of the law, and with this view he actually served an apprenticeship with a writer to the signet in Edinburgh. But being soon disgusted with this employment, he directed his attention to the study of the scriptures, and determined to acquire the qualifications that were necessary for the office of a clergyman. Accordingly, in 1741, before the term of his apprenticeship was fully completed, he attended the divinity lectures of professor Gobdie at Edinburgh; and he afterwards entered himself, as a student of theology, both in King's college, under the care of professor Lumden, and in Marischal college, under the tuition of professor Chalmers. Beside the advantages which he enjoyed at the university for the prosecution of his theological studies, he belonged to a literary society of 14 learned persons, which was established in 1742, and which afforded him additional means and opportunities of improvement.

After completing his studies at the university, and passing through the usual trials before the presbytery of Aberdeen,

Mr. Campbell was licensed as a probationer, or preacher, in 1746: and two years after he was ordained minister of Banchory-Teman, 17 miles W. from Aberdeen. In this situation he excelled as a Scripture critic and lecturer; and composed a variety of discourses, which were distinguished by the simplicity and perspicuity of their style. Here he formed the plan of his Translation of the four Gospels, and here he also drew up a part of his Philosophy of Rhetoric. During his settlement in this country parish, he married a lady, who contributed in a very great degree to the prolongation and happiness of his life. In June 1757 he was translated to Aberdeen, and became one of the ministers of that city, where his character as a lecturer was fully established, and where he delivered a variety of ingenious and learned discourses on rhetoric, criticism, and other subjects, in a literary society, projected on a larger scale than that to which he had formerly belonged, by the late Dr. Reid of Glasgow, and Dr. Gregory, who were at that time professors of King's College, and established in 1758. His first publication was a sermon, preached in 1752, at the opening of the synod in Aberdeen, on the character of a minister, as a teacher and pattern; but as he probably thought that the style of this discourse was too highly ornamented, he did not include it in the number of sermons, which he collected a few years before his death. In 1759 he was presented by his majesty to the office of principal of Marischal College, then vacant by the death of principal Pollock. His advancement to this honourable office was partly owing to the interest of Archibald duke of Argyle, to whose family he was related, and partly to his known character as a man of distinguished abilities and literature. Soon after his appointment to this office, he published his celebrated "Dissertation on Miracles," in answer to Mr. Hume's essay on this subject, and thus deservedly gained the reputation of a most acute metaphysician, and a well-bred polemical writer. The substance of it was delivered in a sermon before the provincial synod of Aberdeen in 1760, and afterwards moulded into the form of a dissertation. Before it was published a copy of it was sent to Dr. Blair of Edinburgh, and communicated to Mr. Hume; and when the author had availed himself of the remarks both of his friend and of his opponent, he presented it to the public in 1763. Mr. Hume, in a letter addressed to the author, acknowledged the civil and obliging manner in which he had been treated; and the Dissertation was so well received by the public, that it soon passed through several editions, and was translated into the French, Dutch, and German languages. For a particular account of the author's reasoning in this dissertation, see our article MIRACLES. Some time before the publication of this treatise, the author, without any solicitation on his own part, received the degree of doctor of divinity from the neighbouring University of King's College in Old Aberdeen: a title which he was more ambitious to deserve than to obtain. Dr. Campbell continued for 12 years to discharge the offices of principal of Marischal College, and of one of the ministers of Aberdeen; which he did with great honour to himself and satisfaction to those with whom he was connected. During this period he amused himself with the study of botany, in which he became a great proficient; and beside acquiring a considerable knowledge of Hebrew, as well as improving his acquaintance with the Greek and Latin, he made himself master of the French and Italian, so as to become a critic in these languages. In 1771 he was elected, by the town-council of Aberdeen, professor of divinity in Marischal College in the room of Dr. Gerard; and though he resigned his pastoral charge as one of the ministers of Aberdeen, the united offices of principal and professor of

Marischal College devolved upon him a variety of duties, which required great application and exertion. As professor of divinity he nearly doubled the number of lectures which the students had been accustomed to receive, and he finished his course in four years, so that every student had an opportunity, if he thought proper, of attending the whole of it. His prelections, in the plan or outline of them, were equally simple and comprehensive. They contained, under the theoretical part, every thing that the student of divinity should know; and, under the practical branch, every thing that he should do, as a reader of sacred and church history, a scripture critic, a polemic divine, a pulpit orator, a minister of a parish, and a member of the church courts on the Scotch establishment.

Under the first head, or *theory*, he included sacred or church history, sacred criticism, and polemic divinity. On sacred or church history he delivered those prelections, which he afterwards prepared for the press, and which were published after his death by the Rev. George Skene Keith, in 1800, under the title of "Lectures on Ecclesiastical History," 2 vols. 8vo. On the subject of Scripture criticism, instead of a tedious and uninteresting discussion of many separate and minute particulars, he laid down general rules or canons, by which the students themselves might be critics without depending upon any commentator. These canons were published in his Translation of the four Gospels. His general directions with regard to polemic divinity may be summed up in the following sentences, which, being expressed in the most simple and concise language, may be soon read and easily remembered. We shall transcribe them for the benefit of those readers whom they may more immediately concern. "Begin with studying the Scriptures in the original languages; attend carefully to the distinction, that should always be made, between classical or pure Greek, and the Greek of the Septuagint and Testament, where the words, taken separately, are pure Greek, but where the idiom of the language, and even the acceptance of many of the words, is derived from the Hebrew, the Chaldaic, or the Syriac. Be acquainted with the civil history, the manners and customs of ancient times and nations, especially with that of the Jews, where the reading of Josephus will often be useful. But whatever books you read occasionally, read the Scriptures frequently. Mark the different passages which you do not understand; read them with patience, not being too anxious to understand every thing at the first reading over. But persevere and read the Scriptures in the original, a second and a third time; and, without consulting any commentator, those difficult passages will always become fewer as your knowledge increases. Read the Scriptures also with modesty, neither being too full of yourself, nor supposing that human reason can always comprehend divine mysteries: and read them always with fervent prayer to God, the source of wisdom and light, that he would assist and direct you in your researches after truth. Do not complain that you want books, when you have the Scriptures themselves in the original languages. If you have a Hebrew Bible, a Septuagint, and a Greek New Testament, you have the most necessary, and the most useful, of all books to a Christian divine. Read carefully all the versions which are given of disputed passages; make much use of versions, and compare them all carefully with the original. Read the Vulgate, though a translation authorized by the Romish church, as well as the versions of individuals, such as Castalio, Beza, Junius, and Tremellius; and also Houbigant, if you have access to his translation. You cannot be hurt by reading versions, and comparing them with the original. But put no confidence in commentators. Consult them sparingly, never use them

till the last, and then use them only as dictionaries. In this view, however, read commentators of all parties; and judge of them more from their freedom of thought, abilities, and erudition, than from considering to what party they belong. In comparing the different kinds of commentators with one another, remember, that paraphrasts are the worst, because they undertake too much or promise most; while scholiasts are the best, because they undertake and promise least. Be on your guard against too much ingenuity in commentators: for genius, in this case, has often led them astray, where humble piety, and plain common sense, would have kept them in the right path. Beware particularly of any attachment to a pre-conceived system; and do not think, that you will be safe, if you use what you call an approved commentator. (It is a pity, though there were less danger of being misled, that a young man of taste, learning, and genius, should be chained to the opinions, or kept in the trammels, of a commentator.) See always with your own eyes, and not through the spectacles of glossarists, commentators, or paraphrasts. Remember that your errors will be much more pardonable, when you use your own eyes, and when you come short of the truth, after making the best use of your own reason, than when ye are led implicitly by passion, or by prejudice. Let your religious system be the last thing that ye make; or where ye have made one in early life, be still correcting it, as you acquire more knowledge—not contending for the opinions of men, but enquiring after the mind of the Spirit."

Under the second general head, viz. *Practice*, or the practical part of theology, Dr. Campbell delivered several excellent prelections to the students, comprehending pulpit eloquence (See ELOQUENCE), propriety of character in private life, or teaching by example, and propriety of character in public conduct. His manner of delivering these lectures was such as to captivate and fix the attention of his students. His deep and extensive erudition was irradiated by his fine imagination; and those prelections, which were the most abstracted and learned, were rendered entertaining by strokes of wit and humour which Dr. Campbell took occasion to introduce. Besides, he recommended himself to the students, not only by the justness of his criticism, and by his lively mode of lecturing, but by the condescension and amiableness of his whole conduct.

Dr. Campbell, in his 72d year, was seized with a severe illness, which threatened his life; but, contrary to his own expectations and those of his friends, he recovered; and though his bodily strength was impaired, he resumed his former occupations and studies. Some years before his death he made a disinterested and unsolicited offer of resigning his professorship of divinity, provided that any one of those gentlemen whom he named, and to whom he applied for their consent, were chosen to succeed him. The offer, however, was not accepted by the patrons of the professorship, and he consented to retain it, lest an improper person should, in his life-time, be chosen as his successor. But when application was made to him, and also to the town-council of Aberdeen (the patrons of the professorship) in favour of Dr. William Laurence Brown, late minister of the English church, and professor of moral philosophy, of the law of nature, and of ecclesiastical history, in the University of Utrecht, who had been driven from these offices in consequence of the French invasion, he instantly resigned, in 1795, his charge of professor of divinity and minister of Gray Friars, which were worth 160l. a year; and expressed much satisfaction in the appointment of his successor. Soon after his resignation of the professorship, government, desirous of testifying, in a public manner, the high respect so justly

justly entertained of his abilities and services, offered him, on condition of resigning the principalship of Marischal College, a pension of 300*l.* a year. Dr. Campbell accepted this token of his majesty's munificence, and was succeeded in the office of principal also by Dr. Brown. This pension, however, he did not long live to enjoy; though he continued writing till within a week of his death; an event, which he expected with great tranquillity and composure. On the 31st of March, 1796, after some previous symptoms of uneasiness, he was struck with the palsy, which deprived him of speech, and under which he languished for a few days till he died. He had long accustomed himself to prepare for death; in a former illness he had given the testimony of a dying man in favour of religion; and, therefore, he was peculiarly happy in not feeling the pangs of dissolving nature. A funeral sermon was preached, on occasion of his death, by Dr. Brown, in which he has given a sketch of his character as a public teacher, as the head of a public seminary of learning, and as a private christian. His character is thus summed up in a few sentences by his biographer, Mr. Keith. "His imagination was lively and fertile—his understanding equally acute and vigorous—and his erudition was at once very deep and wonderfully diversified. His piety was unfeigned—his morals unimpeached—his temper cheerful—and his manners gentle and unassuming. His love of truth was even more remarkable than the uncommon success with which he sought after it. Where intuitive faculties could be of service to any man, he saw at once if he saw at all. But his deep perspicacity was not satisfied with a superficial view of any thing: his piercing eye darted to the bottom of every subject, to which discernment could be applied. Where study and reflection were necessary, he could bestow as much time on patient thinking, as if he had been possessed of no genius at all, and had acquired only a small share of erudition. And when once he began to examine any subject, he was never satisfied till he had viewed it in every light in which it could be seen. He always fought for truth in the love of truth, but he could not bear to be suspected of deviating from it; for he neither courted those who might support, nor feared those who did oppose him. The tone of his mind was high, and he would not let it down from the elevation of truth and of virtue. Whether engaged in conversation, or employed in study, he could pass easily from the lightest subject to the most serious one. And the reach of his mind was so great, as to comprehend a great variety of subjects. He could explore the causes of that pleasure, which arises in the mind, from dramatic entertainments, and lay down the rules of Scripture criticism. He could illustrate the whole theory of evidence, or detect the false reasonings of Mr. Hume. He could explain the spirit of the Gospel, marking the extremes of superstition and enthusiasm; and both as a philosopher, and a divine, declare the nature, extent, and importance, of the duty of allegiance. While he zealously contended for the faith, he could warn the Christian against imbibing a persecuting spirit and yet show the influence of religion upon civil society, warning his countrymen against infidelity, before they had seen its dreadful effects. He could, with manly eloquence, describe the success of the fishermen of Galilee, while preaching the doctrine of the cross to prejudiced Jews, learned Greeks, and ambitious Romans; and at the same time, with well applied erudition, he could delineate the characters of the pretended successors of the apostles, and trace the progress of the hierarchy through all the dark and middle ages, until the reformation of religion. As the principal of a college, a professor of divinity, or a minister of the Gospel,—as a true pa-

triot, a good man, and a sincere Christian; *Quando ullum invenies parem?*"

His different publications in chronological order, beside the Dissertation on Miracles, and a single Sermon already mentioned, are as follow:—In 1771 he preached before the Synod of Aberdeen his sermon on the Spirit of the Gospel, in which he struck at once both at fanaticism and superstition, and at fanatics and superstitious persons of all parties and descriptions. In 1776 he published his "Philosophy of Rhetoric," which established his reputation, as an excellent grammarian, an accurate and judicious critic, a man of fine imagination and delicate taste, and a philosopher of great acuteness and deep penetration. The two first chapters of this book had been composed as early as 1750; and a remarkable coincidence had taken place between him and Dr. Beattie, on the subjects of wit, humour, and ridicule. In 1776 he preached a sermon on the National Fast, occasioned by the American war, in which he discusses the nature, extent, and importance of the duty of allegiance, and which was very popular. Six thousand copies of it were afterwards published at the desire of dean Tucker, and circulated through America. Although in this sermon he maintains, that the British colonies in America had no right, either from reason or from Scripture, to throw off their allegiance, he insinuates that America should be allowed to be independent rather than that Great Britain should continue the war. In 1777 Dr. Campbell published a sermon on the success of the first publishers of the Gospel considered as a proof of its truth, before the Society for propagating Christian knowledge, in which he states this argument for the truth of Christianity in a very forcible manner. In 1779 he published an address to the people of Scotland, on the alarms which had been raised by the bill in favour of the Roman Catholics; in which address he considers the doctrine of the Gospel with regard to persecution; the conclusions to which sound policy would lead us in the toleration of the papists; and the proper and Christian expedients for promoting religious knowledge, and repressing error. This address exhibits a striking evidence of the liberality of the author's mind, with respect to those who differed from him in opinion, and of his dislike of every species of intolerance and persecution. In the same year he published a sermon on the happy influence of religion on civil society, which was preached at the assizes at Aberdeen. In this valuable discourse the preacher has shewn, in the most satisfactory manner, that "religion is highly conducive to the exaltation and felicity of the body politic, or nation, by the tendency and extent of its laws, by the assistance which it gives to the civil powers, both in securing fidelity and in discovering truth; by the nature and importance of its sanctions; by the positive enforcement of equity and good government on the rulers, and of obedience and submission in the people." The last work which Dr. Campbell lived to publish, was his "Translation of the Four Gospels, with preliminary Dissertations and explanatory Notes," in two 4to. volumes. His posthumous work, entitled "Lectures on Ecclesiastical History," has been already mentioned. See Keith's Account of the Life and Writings of Dr. George Campbell, prefixed to his "Lectures."

CAMPBELL, in *Geography*, a county of America, in the state of Virginia, lying E. of Bedford county, on Staunton river. It is 45 miles long and 30 broad; and contains 7685 inhabitants, including 2488 slaves.

CAMPBELL'S *fort*, a fort of America, in the state of Tennessee, near the junction of Holston river with the Tennessee; 135 miles from Abingdon, in Washington county, Virginia, and 445 W. of Richmond in Virginia.

CAMPBELL'S *Jalines*, a tract of country in America, in North Holland, in the state of Tennessee, discovered by captain Charles Campbell, who obtained a patent for it in 1753 from the governor of Virginia. Since the discovery of salt-water, and the manufacture of salt in this district, it is become very valuable, and many thousands of people are now supplied from it with salt of a superior quality, and at a low price. It consists of about 300 acres of salt marsh land, in which pits are sunk for obtaining the salt-water. The best is found at the depth of from 30 to 40 feet; and after passing through the rich soil or mud, from 6 to 10 feet, you come to a very brittle lime-stone rock, with cracks or chafms, through which the salt-water issues into the pits, whence it is drawn by buckets and put into the boilers, which are placed in furnaces adjoining the pits. The hills, that surround this flat, are covered with fine timber; and a coal-mine has been discovered not far from it.

CAMPBELL-TOWN, is a royal borough in the county of Argyle, Scotland, seated on the banks of the lake of Kilkerran, on the eastern shore of Kintyre, of which it is the presbytery seat. This place was merely a small fishing village till 1701, when it was constituted a royal borough, and obtained its present appellation. Previous to that period it was called Ceann-loch (Loch-head) which it still retains in the provincial language of the country. From the establishment of a fishery here, and the advantage of a good harbour, this place has greatly increased in size and consequence. The harbour is about two miles long by one broad, and assumes the form of a crescent. It is surrounded by high hills, and protected at the entrance by an island. The anchorage is good, and measures from six to ten fathoms water. It is appointed the rendezvous of the buffes employed in the herring-fishery, which is the principal trade of the place. Beside the fishery, here is a considerable trade in the distillation of whiskey. The parish of Campbell-town is about 11 miles by 8, and includes the greatest portion of the district called Kintyre. It is narrowed in the middle by the bay of Machyr-hanish on one side, and the loch of Kilkerran, or harbour of Campbell-town, on the other. The soil of the parish is various, but the arable land is well cultivated and fertile. At the distance of three miles are some coal-pits, and a canal has lately been finished to communicate with the collieries and the town. A quantity of fuller's earth, or a kind of soapy rock, is obtained in this parish. In 1791 the population amounted to 8700. This town, with Air, Irvine, Inverary, and Rothsay, unite in sending one member to the imperial parliament. It lies 176 miles W. by S. from Edinburgh.

CAMPBELL-TOWN, a large and flourishing town of America, in North Carolina, seated on a branch of Cape Fear river, 100 miles above Wilmington; the resort of many inhabitants and travellers, who carry on a continual commerce by wagons, from the back settlements, with large trading boats. —Also, a village in Dauphin county, Pennsylvania, seated near a water of Quitipihilla creek; 13 miles E. of Harrisburgh, and 96 N. W. of Philadelphia.

CAMPDEN, or CAMPDEN-CHIPPING, anciently *Campdene*, is a borough and corporate town of Gloucestershire, England, situated in a fertile valley, surrounded by cultivated hills and hanging woods. Its remote origin may be inferred from the circumstance of the Saxon kings assembling here, in the year 687, to consult on the mode of carrying on the war with the Britons. The era, however, in which it attained the greatest importance, was the 14th century, when it became a principal mart for wool, and the residence of many opulent merchants, who exported that commodity to Flan-

ders, which was then the seat of the manufacture of cloth for the general supply of Europe. After the establishment of this trade in England, and the more general diffusion of the wool business, Campden was gradually deprived of its consequence; and both the merchandize and manufactures of early days are now totally lost. In a charter granted by James I. in the year 1605, it is stated that this town was an ancient vill, and originally incorporated: it is therein ordered, that its government should in future be vested in two bailiffs, twelve capital, and twelve inferior burgesses, a steward, &c. By the charter, the bailiffs and steward were empowered to hold a court of record every fourth Friday, and to take cognizance of all pleas of trespass, debt, contract, and fraud, within the borough; provided the respective actions were for sums not exceeding 6l. 13s. 4d. The buildings are principally ranged in one street, nearly a mile in length; about the middle of which are the court and market houses. The former is an ancient structure; and the latter was erected, by sir Baptist Hickes, in the year 1624. A capacious mansion, yet remaining, of nearly the same age as the court-house, is said to have been erected as a residence for one of the wool-merchants. The church, dedicated to St. James, stands on an easy eminence above the town, in the hamlet of Berrington, which tradition affirms to have received its name from the tumuli, or barrows raised over the bodies of those who were slain in a great battle fought here between the Mercians and the West Saxons; whose respective encampments are said to have been at Willersey and Meen-hill in this vicinity: a bridge at Berrington now bears the name of Battle-bridge. The church is an elegant structure, and consists of a spacious nave, 60 feet high, with an aisle on each side, a chancel, and a tower at the west end, 120 feet high, ornamented in a very chaste style. At the east end of each aisle is a chapel; that on the south side is the burial place of the families of Hickes and Noel. To the munificence of the wool merchants, in the flourishing period above-mentioned, it is probable that this beautiful building owed its erection: several of them are here interred, with brass effigies and memorials. Near the church are some remains of a very magnificent mansion, erected by sir Baptist Hickes, soon after he purchased the manor, early in the 17th century. The population of this parish, as returned under the late act, was 1213 persons, who were chiefly employed in manufactures; the number of houses 255. Various donations have been made, for the use of the poor, and other beneficial purposes, particularly by sir Baptist Hickes, whose "good deeds done to this towne" have found an accurate register in Stow. Campden is 90 miles N.W. from London; and has a weekly market on Wednesdays. Among the more distinguished natives of this town are Dr. Robert Harris, a celebrated preacher in the interest of the commonwealth parliament, and Mr. George Ballard, author of "Memoirs of British Ladies."

The vicinity of Campden was the theatre of the *Cotef-wold Games*, which, in the reigns of James I. and his unfortunate successor, were greatly celebrated in this part of England. They were instituted by a public-spirited attorney, named Robert Dover, of Barton-on-the-Heath, in Warwickshire, and, like the Olympic games of the ancients, consisted of most kinds of manly exercises. The victors were rewarded by prizes distributed by the projector, who for many years superintended the games in person. Ben Jonson, Drayton, and other poets of that age, wrote verses on this festivity. These were collected into one volume, and published under the title of "*Annalia Dubrensis*," in 1636. The breaking out of the civil war terminated these diversions; but the remembrance of them is yet preserved by an annual meeting

of young persons on Dover-hill, an eminence about half a mile from Campden, where the principal games were celebrated.

CAMPEACHY, a town of America, in Old Mexico, or New Spain, situate in the province of Yucatan, on the west shore of a bay of the same name in the gulf of Mexico. Its houses are well built of stone; when taken by the Spaniards, it contained 3000 houses, and had considerable monuments of Indian art and industry. It has a good dock and fort, with a governor and garrison, commanding both the town and harbour. It has been often stormed and taken, both by the English and French Buccaneers, viz. in 1659, 1678, and 1685, at which last time these freebooters plundered the whole country within 15 miles about it, set fire to the fort and town, which the governor would not consent to ransom, and burnt to the value of 50,000 l. of Campeachy wood, which was a part of their share of the plunder. The port is large but shallow; and it used to be a stated market for log-wood, of which great quantities grew in the neighbourhood, before the English landed there, and cut it at the isthmus, which they entered at Trieste island, near the bottom of the bay, 40 leagues S.W. from Campeachy. The chief manufacture is cotton cloth. N. lat. $19^{\circ} 30'$. W. long. $91^{\circ} 30'$.

CAMPEACHY, or **CAMPECHE Wood**, in *Botany*. See *HÆMATOXYLUM Campechianum*.

CAMPEGGI, **LORENZO**, in *Biography*, an eminent civilian and prelate of the Romish church, was born at Milan in 1474; and having been educated to the profession of the civil law, taught it first at Padua, and afterwards at Bologna. After the death of his wife, he entered into the ecclesiastical state, and in 1510 was made auditor of the Rota at Rome. In 1512 he was advanced to the bishopric of Feltre by Julius II. and deputed as his nuncio to Milan and into Germany. In 1517 he was created a cardinal by Leo X.; and in 1519 sent as legate to England to collect the tenths for the war with the Turks; but he only succeeded in obtaining the bishopric of Salisbury. In 1524 he was appointed bishop of Bologna, and delegated by Clement VII. to oppose the progress of Lutheranism in Germany. His legation to Henry VIII. of England, with which he was intrusted in 1528, was a very difficult charge, as, in conjunction with Wolsey, he was to pronounce sentence concerning the king's divorce from his queen Catherine. When Henry could not be prevailed upon to renounce his project, Campeggi tried to persuade Catherine to consent to a voluntary separation, that he might thus save the honour and authority of the church; but his endeavours were unavailing. In the following year he was recalled to Rome, and commissioned to attend as legate at the diet of Augsburg. He died at Rome in 1539; having, as a man of learning, enjoyed the esteem of Erasmus and of other eminent scholars, and having approved himself a faithful servant of the church, in times and circumstances peculiarly critical and embarrassing. His constitution for the reform of the German clergy, and his letters, throwing light on the history of his time, of which the principal are found in a collection of letters written to Frederic Naufea, and printed at Basil in 1550, are the only literary remains of him that are extant.

His brother, *Thomas Campeggi*, who succeeded him in the bishopric of Feltre, was a learned canonist, published several works relating to the canon law, and died in 1564. Moreri. Tiraboschi.

CAMPÉL TREVE, in *Geography*, a town of France, in the department of the Ille and Villaine, and district of Redon; $\frac{5}{4}$ leagues S.W. of Rennes.

CAMPELLO. See **CALLAO**.

CAMPEN, a tolerably large and handsome town of the United Provinces, seated on the west side of the river Yssel, near its mouth, built in 1286, and fortified after the old manner. The most remarkable public buildings are the town house, and the churches of St. Nicholas and Notre Dame. It was formerly a place of considerable trade; but the port is now choked up by sand; distant 15 leagues N.E. from Amsterdam, and 13 N. from Arnheim. N. lat. $52^{\circ} 38'$. E. long. $5^{\circ} 35'$.

CAMPENEAC, a town of France, in the department of Morbihan, and district of Ploermel; $\frac{1}{2}$ league from Ploermel.

CAMPER, **PETER**, in *Biography*, an ingenious and skilful anatomist, physician, and surgeon, born at Leyden in 1722, was early placed by his father under the De Moeres to learn the art of designing and painting, in which he made sufficient progress to enable him to make drawings of such anatomical preparations as he chose afterwards to have engraved. Quitting the pencil, he entered student at Leyden, under Boerhaave and the other professors in that university, but applied in a more particular manner to anatomy, which was his favourite study. In 1746 he took the degree of doctor in philosophy and medicine, but continued his residence in Leyden until the year 1748, when he came to London, to attend the hospitals and anatomical lectures in this city; and having diligently employed twelve months in improving himself, and in forming connections with the principal anatomists here, he went to Paris. During the tour which he made in England, France, and Switzerland, in 1749, he was appointed professor of philosophy, medicine, and surgery at Franeker; and, in 1755, he was translated to the chair of surgery and anatomy at the Athenæum of Amsterdam, where he was, in three years afterwards, also appointed professor of medicine. Not finding that he enjoyed the quiet at Amsterdam which was suited to his habits of life, he quitted it in 1761, but retained the title of honorary professor in that capital. He passed two years at his country-house in Friesland, and was then nominated professor of medicine, surgery, anatomy, and botany at Groningen. There he lived till June 1773, when he settled at Franeker, in order to superintend the education of his sons. From this period to that of his death, at the Hague in April 1789, he was occupied in the prosecution of his favourite studies, in visiting various parts of Europe, and in the performance of many public duties, to which he was called by the wishes of his countrymen. In 1762 he had been appointed a representative in the assembly of the province of Friesland; but, in 1787, he was nominated one of the council of state, and was therefore obliged to reside at the Hague. His death, at the age of 67, was occasioned by a pleurisy. Though he taught and cultivated every part of surgery, yet his attention seems to have been more particularly paid to the practice of midwifery, in which he had been instructed by professor Trioen, who shewed him the use of the lever of Roenhuyfen. Of this instrument he gave an historical account to the Royal Academy of Surgery at Paris, which is published in the fifth volume of their Memoirs, and which procured him the honour of being made one of their foreign associate members in the year 1774. He had before been made honorary member of the Royal Society in London; and was afterwards, in succession, appointed fellow of the Royal Society, and of the College of Physicians at Edinburgh, and of the Imperial Academy at Petersburg, and of the Royal Academy of Sciences at Paris, to each of which societies he had sent communications. He appears to have meditated a work of considerable magnitude, and

and importance, of which, however, only two parts were published; viz. "Demonstrationum Anatomico-Pathologicarum Liber primus, continens brachii humani fabricam et morbos, in folio maximo, cum quatuor figuris," Amstel. 1760; and "Liber secundus, continens pelvis humanæ fabricam et morbos," 1762. The plates, which are commended for their accuracy, are from drawings made by the author. A small time before his death he published in a Dutch journal at Amsterdam "An Account of a Method of performing the Operation of Lithotomy at two different times, by Peter Camper, M.D. &c." The process was communicated to him, he says, by M. Louis, who assured the author that since he adopted it, he had not lost a single patient by lithotomy. The operation is performed at twice, that is, on the first day the surgeon makes the incision into the bladder, the patient is then to be put to bed, and the extraction of the stone deferred until the second, third, or fourth day. By this delay, the stone was at length taken away with greater facility, and with less pain to the patient, than when the whole of the business was completed at once. The method is not, however, new; it had been recommended by Peter Franco, who lived more than two centuries ago, and it has long since been laid aside again, as attended with much greater inconveniences than the advantage expected compensated. A translation of this paper is published in the tenth volume of the London Medical Journal for the year 1789.

In 1789 his son, M. Adrian Gilles Camper, published at the Hague, in Latin, "A Dissertation on the fracture of the Patella and Olecranon," by his father, 4to. The object of this dissertation is to inquire into the various circumstances attending the accidents which are distinguished by the general name of fractured patellæ. It is enriched with a large number of cases, and with quotations from, and references to, the most celebrated authors on the subject; and it is accompanied with two plates, which do not reflect much honour on the artist. The last describes the perfect cure of a fractured patella, though the upper and lower parts of the bone remained four inches distant from each other. In 1791 his son published at Utrecht in 4to. another work entitled "Verhandeling van Petrus Camper over het natuurlyk Verschilder Wezenstrekken, &c." i.e. Treatise of the late Peter Camper on the natural difference of features in persons of various countries and ages; and on beauty, as exhibited in ancient sculpture and engravings. Followed by the description of a method of delineating various sorts of heads with accuracy. The professed object of this publication is to prove that the principal rules, laid down by the most celebrated painters and limners, are very defective; that they enable the student neither to delineate national characteristics in the countenance, nor to imitate the beauties of ancient sculptors and artists. He contends that the observations of the abbé Winckelman, concerning *ideal* beauty, are not well founded; and he professes to have discovered, in what that species of beauty really consists. It is in consequence of the imperfection of rules, he observes, that men of eminence have been so defective in their portraits of national characters; thus, in the paintings of De Wit, the chief signature of a Jew is a long beard; and Guido Reni, C. Marat, Rubens, and others have given no other characteristic of Moors than a black complexion. He denies the propriety of making either the oval, as is the most common method, or the triangle, as some artists have proposed, the foundation of portraits to be taken in profile: and he proposes more certain principles in their place. Neither the author's principles nor his mode of illustrating them, can be well understood without the plates that accompany this work. The general doctrine, however, is, that the difference in form and cast

of countenance proceeds from the relation which the cranium is found to bear to the direction of an horizontal and a perpendicular line. Let us suppose a frame of wood, similar to that of a picture, to be made perfectly square; and that the upper part be graduated into 90 degrees, proceeding from the right to the left. Let the cranium or head be placed in the centre of this frame. Draw an imaginary line from the lower part of the upper lip to the forehead, which the professor terms the *linea facialis*, and observe in what degree it intersects the upper part of the frame; and this will give one characteristic, and the situation of the maxillæ, respecting the perpendicular side of the frame, another. E. G. the *linea facialis* of the orang will intersect the horizontal line at 58; that of the Negroc at 70; that of the European, at 80 or 90; while, in the Grecian antique, the facial line will project ten degrees beyond the limits of the frame, forming an angle in a different direction. In the ape, the negroc, and the calmek, the maxillæ project in various proportions beyond a perpendicular line drawn from the lower part of the forehead to the chin; in the European, the maxillæ are on a line with the perpendicular; and in the antique, they recede within it. According to this position of the *linea facialis*, are every other part of the head, the position of the eyes, of the mouth, ears, &c. regulated. This Camper proves by various examples.

In 1792 the professor's son published at Utrecht, in 4to. a sequel to the preceding treatise, entitled, "Reden voeringen van wylen Petrus Camper, &c." i.e. Lectures of the late Peter Camper on the manner of delineating the different emotions of the mind in the countenance;—on the striking resemblance between quadrupeds, fowls, fishes, and the human species;—and on the constituent beauty of form. Illustrated by plates. The first lecture treats of the manner of representing the different emotions of the mind. For this purpose the first object, he says, is to become well acquainted with the form of the cranium;—the second, with the principal muscles of the face;—and the third, with the nerves which set these muscles in motion. E. G. a person under the influence of sorrow and melancholy, suffers his head to sink, as it were, under the weight of the oppression, or he supports it with his hand. The muscles of the neck no longer maintain the equipoise; that is, the nerves belonging to the neck are rendered inert by the influence of this passion. On the contrary, a person under the influence of mirth and of violent laughter, elevates his head; his breast is agitated; he holds his sides with both hands; his legs begin to fail him, and he would roll on the ground, if the fit continued. A man in a rage, beats with his hands, stamps with his feet, and his face is violently convulsed. Respect impedes speech; an inward trembling takes away the power of motion, the heart beats, and the liveliest eyes look downward; if shame accompanies the emotion, the blood paints the face, neck, and breast with crimson. Thus, in all emotions, particular nerves are affected; and, consequently, it is the business of every painter to make himself acquainted with these, &c. Conformably to this plan, the professor having first given to his audience a general idea of the form of the cranium, of the principal muscles of the face, and traced the course of the nerves, proceeded to point out, by various drafts or sketches, the changes produced in the countenance in the emotions of surprise, contempt, complacency, laughter, sorrow, weeping, wrath, and in death. The second lecture treats of the similarity which exists between quadrupeds. The professor maintains that in all the larger animals, inhabiting the three elements, there is one part of the body common to all, and very similar in its form; that the great diversities observable in the animal creation, from man down to the finny tribe,

proceed from the diversity which takes place in the appendages to this central part; and that these diversities are according to the nature of the animal, to the element which it is destined to inhabit, to the kind of food by which it is nourished, and to the particular manner of obtaining this food. The permanent part is the trunk; that is, the vertebrae of the back and loins, with the ribs. He then illustrates this general idea in the horse, camel, elephant, greyhound, &c. and then deduces the following self-evident conclusion, that the more perfectly an artist is acquainted with the nature of animals, and the designs of their formation, the better he will succeed in delineating them. In the sequel of this lecture, various rules are laid down, and examples given, by which artists may be enabled accurately to delineate the horse, cow, dog, camel, &c.; or, with a few strokes of the pencil, to convert the one into the other, merely by an attention to these rules, and to the deviations which take place in consequence of the particular nature of the quadruped. In the third lecture the idea is extended to birds and fish.

In the year 1803, a collection of Camper's works was published at Paris, in 3 vols. 8vo. and a folio atlas of plates, under the title of "*Oeuvres de Pierre Camper, qui ont pour Objet l'Histoire Naturelle, Physiologie, et l'Anatomie Comparée, &c.*" i. e. The works of Peter Camper, which treat of natural history, physiology, and comparative anatomy. To these volumes a general account of his life, by his son, is prefixed, of which we have availed ourselves in the compilation of this article. The first volume comprehends a dissertation on the orang outang, and some others of the monkey tribe, a memoir on the double-horned rhinoceros, another on the rein deer, and conjectures relative to some petrified bones found in the mountain of St. Pierre, near Maastricht, which professor Camper considers as the bones of fish. In his account of the orang outang, the professor remarks, that immediately below the skin and platysma myoides, two bags made their appearance on each side of the windpipe, the right extending over the clavicle, the left being much less. These bags were empty, and each of them communicated with the cavity of the larynx, by means of an opening passing between the thyroid cartilage and the os hyoides, and terminating at the side of the epiglottis. Some species of monkeys had one bag of a similar kind, but the possession of two the professor considers as peculiar to the orang outang. This organization seems to have been known to Galen; but its uses are unknown, except that these cavities can be filled with air, and compressed, at the pleasure of the animal. The professor observed a conformation in the throat of the rein-deer, resembling that noticed above, with regard to some kinds of monkeys. The second volume is chiefly occupied with an interesting account of the elephant; and this article is followed by two essays, one on the physical reasons which render man subject to more diseases than other animals, and on the means of establishing health, which can be derived from comparative anatomy; the other on the origin and the colour of the negroes. Their origin is ascribed to our first parents, and their colour to the long continued effects of the climate in which they lived, the food by which they were nourished, and the diseases to which they were subject. The third volume contains lectures on an epidemic disease of horned cattle; a dissertation on the physical education of children; lectures read to the Academy of Painting; an account of the generation of the pipa, or American toad; observations on the croaking of male frogs; and an account of the structure of the bones in birds. In his lectures delivered to the Academy of Painting, the author discusses the subject of physical beauty, and his general conclusions are the following: viz. That no phi-

losopher, or artist, has ever proved or taught what properly constitutes physical beauty;—that we have no innate idea of this, as we have of moral beauty; and that it is only by means of study that we arrive at the knowledge of what is beautiful in the imitative arts;—that physical beauty, whether in man and other animals, or in architecture, does not consist in a certain proportion or symmetry of parts;—that in giving different forms to men and animals, nature has not aimed at endowing them with a certain degree of beauty, but only at bestowing upon them what is useful in their particular sphere;—that all which relates to physical beauty is founded only on tacit consent, habit, and authority;—and that the true and only beauty which exists, and such as the greatest masters have introduced into architecture, painting, and sculpture, can be referred to nothing more than the care which they have taken that their works should imitate nature as faithfully as possible: while they, at the same time, avoid the faults which necessarily result from the imperfection of vision, and the refraction of light. No particular form, says this author, can, abstractedly considered, constitute beauty; the real basis of beauty, according to his reasoning, consists in the means being adapted to the end; and, exclusively of this, our ideas are influenced by customs, national prejudices, and implicit confidence in the taste and opinions of others. This is a subject which has been treated with metaphysical acumen by Burke, Smith, Alison, and Sayer. See BEAUTY.

The essay on the structure of the bones of birds, which terminates this work, contains an account of the same peculiar conformation which was described by Mr. John Hunter in the Philosophical Transactions for 1774; but it appears that this curious structure was discovered by professor Camper three years before Mr. Hunter's publication of it, and that it was soon afterwards made known to many scientific men on the continent. The account of the professor's discovery was mentioned in a dissertation read by M. Charnack, at a public meeting of the university of Groningen, August 25, 1773, but Mr. Hunter's paper was not read to the Royal Society till the February following. See BIRD. The atlas accompanying these volumes contains a number of well executed plates.

CAMPESTRE, in *Antiquity*, a sort of cover for the privities, worn by the Roman soldiers in their field exercises; being girt under the navel, and hanging down to the knees. The name is supposed to be formed from *campus*, the field or place where the Roman soldiers performed their exercises.

CAMPESTRIS, in *Entomology*, a species of CIMEX, commonly found in meadows. The colour is yellowish, with a ferruginous spot on the wing-cases. Fabricius.

CAMPESTRIS, a species of CICINDELA, common in most countries of Europe. It is of a green colour, with five white dots on the wing-cases. Linn. &c. Inhabits sandy fields chiefly. Donovan. Brit. Inf. &c.

CAMPESTRIS, in *Ornithology*, a species of ALAUDA, about seven inches long, that inhabits Europe. The tail-feathers are brown, with the lower half, except of the two middle ones, white: chin and breast yellowish. Linn.

This is called by Brisson *Alauda Campestris*, and by Ray and Willughby, *Alauda minor Campestris*, *Spiolette* by Buffon, *Brachlerche* by Frisch, and *meadow-lark* by Latham.

CAMPHERE, or CAMPHOR-TREE, in *Botany*. See LAURUS *camphora*.

CAMPHOR is a white translucent vegetable product, somewhat unctuous to the touch, and tenacious between the teeth; it may be crumbled between the fingers without difficulty; it has a peculiar fragrant odour, not unlike that

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of rosemary, which diffuses itself to a considerable distance : its flavour is aromatic and bitter, giving at first the sensation of heat, but afterwards of remarkable cold. Its specific gravity is 0.906, so that it just floats on the surface of water : when exposed to a moist and warm air, it readily volatilizes : by the contact of flame it immediately takes fire, burning with a large white flame, and much smoke ; if pure it is wholly consumed, without leaving any residue. When heated in a spoon, it dissolves into an oleaginous liquid.

There are two species of trees from which the camphor of commerce is procured. That with which Europeans are the best acquainted, is the *laurus camphora*, a large forest tree, that grows wild in the islands of Borneo and Sumatra. Of this tree, the leaves, the fruit, and every other part, when bruised, give out a strong odour of camphor, and the wood is much sought after as a material for chests, &c. because its peculiarly aromatic smell renders it impenetrable to ants and other destructive insects. The oldest trees in general contain the largest proportion of camphor, and it is reckoned a good sign if the natural crevices in the principal branches have for some time past yielded spontaneously a quantity of oil of camphor. The camphor itself is found in perpendicular veins near the centre of the tree, or concentered in the knots of the wood. The larger pieces are picked out with a sharp instrument, and the smaller ones are procured by means of rasps, to which the camphor adheres, mixed with small bits of wood and other impurities. The same tree yields also the oil of camphor, which appears to be a very fluid kind of resin, strongly smelling of camphor, and from which a considerable portion of this latter substance may be extracted by distillation. This oil exudes spontaneously from the older trees, but is chiefly procured by incision, in the following way : a cavity capable of containing about a quart is cut in the trunk, into which a lighted reed is introduced for about ten minutes, this draws the juices towards the cavity ; which, in the space of a night, is completely filled with oil ; the same copious flow of juice continues for three nights longer, after which, by a fresh application of heat, a further but less plentiful supply is obtained.

In Japan are large forests of another species of *laurus*, which yields camphor, though not in such abundance as that which we have already described. In this tree the camphor is not contained in concrete masses, so that in order to procure it distillation must be had recourse to. For this purpose, the roots and extremities of the branches, being cut into thin chips, are put into a net or upon a wooden framework, and suspended within a kind of alembic, at the bottom of which is a little water : by the application of a boiling heat, the steam penetrates the contents of the net, and carries the camphor along with it into the capital, where it is deposited like snow on the rice straw with which the capital is lined.

The Sumatran camphor is much more esteemed in the East than the Japanese, from which it may readily be distinguished by its superior adhesiveness, in consequence of which, it is much less volatile than that which has been procured by distillation. All the camphor which comes to Europe is the produce of Borneo or Sumatra, and arrives in the form of irregular lumps of a yellowish grey colour, which are spongy and very light, and when broken discover a crystalline granular fracture.

The purification of crude camphor is an art that is carefully kept secret by those who are in possession of it. Venice had formerly the monopoly of this manufacture, afterwards it was successfully practised in Holland, and at present large quantities are refined by some of the English druggists. The process is understood to be very simple, and

probably consists merely in mixing the crude camphor with chalk or lime, and subliming it in as high a heat as can be safely applied. Spirit of wine has been proposed and employed on a small scale for the purification of camphor, but is ineligible, both on account of its expensiveness and its being incapable of separating any resin with which the camphor may be designedly or accidentally mingled. Simple sublimed camphor differs from the refined camphor of the shops in being of a loose spongy granular consistence like snow, but it may easily be made to assume the close and foliated texture of the latter, by simple fusion in closed vessels.

Although the camphor of commerce is obtained only from the *laurus camphora* and a kindred species in Japan, yet its existence has been proved in many other species of *lauri*. Thus the roots of the cinnamon tree (*laurus cinnamomum*), of the cassia, (*laurus cassia*), of the sassafras (*laurus sassafras*), may be made to yield real camphor by distillation, though not in sufficient quantity to balance the expense. The distilled water of fennel-seeds has been found to deposit crystals of camphor by long standing. It has also been discovered in the fresh roots of galangal, zedoary, and ginger, and in the seeds of cardamom and long pepper. It is probably contained in all the essential oils, and has actually been procured from those of juniper, sage, hyssop, thyme, peppermint, rosemary, and lavender. The deposition of crystalline grains similar to camphor in old essential oils had been observed by many of the older chemists, but no important investigations took place in consequence of this discovery, till Proust took the subject in hand, and shewed, from accurate and large experiments, that camphor may be profitably prepared from the essential oils produced in the southern countries of Europe.

This able chemist having accidentally observed that the essential oil of lavender, distilled in the province of Murcia in Spain, deposited a large proportion of camphor, and that the other essential oils of this district were remarkably fragrant, selected the essential oils of rosemary, marjoram, sage, and lavender, as the subjects of the following experiments. Equal portions of the four oils were placed in shallow earthenware vessels, and exposed to spontaneous evaporation at a temperature not exceeding 57° Fah. and in proportion as the crystals of camphor were deposited, they were taken out and drained, and kept in well-stopped vials. By this simple process the oil

of rosemary yielded	6.25 per cent. of camphor.
— marjoram	10.14
— sage	21.06
— lavender	25

The oil of lavender appears to be fully saturated with camphor, for although when heated it will take up about $\frac{1}{6}$ of its weight more of this substance, yet it deposits by cooling a greater quantity even than it was made to dissolve. When exposed to spontaneous evaporation the filaments of camphor begin to appear in about twelve hours, and continue to be deposited till almost all the oil is evaporated. In the other oils the crystals are later in shooting, according to their relative proportions of camphor, and when about four-fifths of the oil are evaporated, the residue becomes thick, and ceases to deposit any more crystals. The camphor produced by each of these four experiments, being dried by slight pressure between filtering paper, was in dry almost pulverulent crystals as brilliant and almost as white as snow, and so little of the peculiar odour of the oil remained, that it was by no means easy to ascertain, from the smell alone, from what species of oil any particular parcel of crystals was obtained.

The proportion of camphor procurable from these oils depends,

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pends, in some degree, on the rate at which the evaporation proceeds, the quantity being in an inverse ratio to the temperature. If oil of lavender is distilled from a water-bath in an alembic, at a temperature inferior to boiling water, till one-third is come over, the remaining two-thirds will deposit flakes of camphor while cooling; these being removed, and the distillation repeated, a fresh deposition will take place in the residue; and a third distillation will yield all the remaining camphor except about $\frac{1}{2}$ per cent. This, however, being a much more rapid process than spontaneous evaporation, the total produce of camphor from the three distillations does not amount to more than 20 per cent., the rest being held in solution by the oil in the receiver. If the *balneum marie* is made to boil, the produce of camphor will be considerably diminished, and part will sublime into the capital of the alembic. The camphor from oil of lavender, by either of these methods, is not absolutely pure, for when sublimed at a gentle temperature, it leaves behind a small portion of brownish resin still mixed with camphor. The most economical way of refining this camphor is to mix it with half its weight of chalk or lime, or washed wood-ashes, and sublime it, by which operation it loses about $\frac{1}{4}$ of its weight. The produce of refined camphor, therefore, by spontaneous evaporation of the oil of lavender, amounts to about 24 per cent., and, by distillation, is equal to 19 per cent.; this latter method is, however, by far the most economical, notwithstanding the additional expence of fuel and apparatus, as it saves both time and the oil, which would otherwise be entirely lost.

The production of camphor by the action of muriatic acid on oil of turpentine, is a discovery of very late date: it was first effected, accidentally, by M. Kind, in preparing the arthritic liquor of Pott; the experiment was then repeated by Trommsdorff with the same result; and, lastly, the faculty of pharmacy at Paris being informed of these facts, nominated three of their members to repeat the investigation, and make a report on the subject; from which sources the following facts are derived.

A small quantity of camphor may be obtained from oil of turpentine by simple distillation, provided the process is carried on sufficiently slowly. Eight ounces of this fluid were distilled in a glass alembic, at the temperature of about 124° Fah.; four ounces of very highly rectified essential oil passed into the recipient, and the capital was found lined with small crystals of real camphor.

This substance, however, is procured in much larger proportions by the assistance of muriatic acid. Four pounds of oil of turpentine were put into a Woulfe's apparatus, and the retort being charged with an equal weight of decrepitated common salt, and half as much sulphuric acid, the whole of the muriatic acid gas that could be obtained by a moderate heat from these materials, was transmitted into the oil of turpentine, and wholly absorbed by it. In consequence of this, the oil became exceedingly hot, and acquired first a light lemon-colour, and towards the end of the process, a clear transparent brown, a small quantity of a thick oily fluid being gradually disengaged and sinking to the bottom. The liquor being allowed to cool for twenty-four hours, was found converted into a thick crystalline mass, from which, when laid on a sloping surface, the brown liquor drained away. Being then wrapped in filtering paper, and subjected to moderate pressure, twenty-four ounces of a perfectly white crystalline matter were left behind of a peculiar odour, in some degree participating both of oil of turpentine and muriatic acid. The liquor which had drained from the crystals was put into a cool cellar, and, in the space of a few days, was found to have deposited four ounces more of

crystals, and two ounces additional were obtained by exposing it to a powerful freezing mixture. Thus four pounds of oil of turpentine yielded thirty ounces of crystals, or not far short of half its weight.

The crystals thus obtained acquired a dazzling white colour simply by washing them with water, but still retained a terebinthinate odour; and the washings were acidulous to the taste, having taken up a little muriatic acid, but were also highly aromatic. Another portion of crystals being washed with a weak solution of pearlash, was found to resemble common camphor in its odour, that of turpentine having nearly disappeared. It was thought that sublimation would be more effectual than washing, in purifying this camphor; accordingly, two portions of it were mixed, the one with an equal weight of charcoal, and the other of quicklime, and were heated in glass alembics: the capitals soon became covered with radiating crystals of a brilliant white colour, entirely free from the terebinthinate odour, and resembling that of camphor, only not quite so powerful. In this state it floats on the surface of water, and communicates to it a camphoric flavour, is very inflammable, soluble in alcohol, and precipitable from it by the action of water. Nitric acid acts upon it in the same manner as on East Indian camphor, but more slowly; but it appears to be wholly insoluble in acetic acid.

The presence of camphor having been shewn in such a variety of substances, in all of which, when brought to the highest degree of purity, it appears to be absolutely the same, that it may be considered as one of the secondary vegetable principles; hence an inquiry into its chemical properties and composition becomes of considerable interest.

Camphor, on account of its volatility, requires to be kept in well closed vessels; it is not, however, by any means so easily evaporable as is generally supposed. According to Kunsemüller, pulverized camphor spread thin and exposed to the air at a temperature not exceeding 52° Fah. does not lose more than half its weight in 16 weeks; the ratio of volatilization, however, rapidly increases with an increase of temperature. The moisture of the air also has a considerable effect, the loss of camphor being much greater in a humid atmosphere than in a dry one. The degree at which camphor melts is fixed by Venturi at 302 Fah. and by dividing a mass that has been slowly cooled in the direction of its lamination, it appears to crystallize in octohedrons.

Water has little or no action on camphor; at a boiling heat it takes up, however, enough to acquire both the odour and flavour of this substance. By the assistance of gum-mucilage or sugar it forms with water a whitish emulsion.

Alcohol at the usual temperature will take up between a seventh and an eighth of its weight of camphor, and when boiling it will dissolve half its weight, the greater part of which is again deposited by cooling. If equal parts of camphorized alcohol and sulphuric acid are distilled together, the produce is a camphorized ether, and a tenacious black resinous mass remains in the retort. Camphor is also copiously soluble in sulphuric, and probably in all the other ethers. When camphorized alcohol or ether is mixed with water, nearly the whole of the camphor separates in thick curdy flakes, which, when dried, exhibit the camphor unaltered in any of its properties. Oils, both the expressed, the essential, and the empyreumatic, combine with camphor; as also do the resins and balsams. The hardest and driest resins are converted by it into a soft tenacious mass, remarkably soluble in alcohol. The alkalies, whether in their caustic or carbonated state, have no action whatever on camphor; nor will they unite even when assisted with oil or soap.

Sulphur and camphor will combine together by means of
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very gentle fusion; the resulting mass is brittle when cold, but soft and tenacious when warm. The alkaline sulphurets will also unite by fusion with camphor, and retain it when dissolved in water; the addition of an acid to this solution throws down the sulphur and camphor in a state of intimate combination with each other.

When set fire to in atmospheric air or oxygen gas, camphor burns with a copious white flame and black smoky, and is entirely consumed. A large quantity of carbonic acid and carburetted hydrogen is produced. The ultimate constituent parts of camphor appear to be carbon, hydrogen, and oxygen, but in what proportions is not yet ascertained.

Camphor when distilled *per se* rises unaltered; but if mixed with bole in the proportion of four parts of the latter to one of the former, and subjected to dry distillation, it is converted to a butyraceous consistence; and by a second distillation with an equal quantity of fresh bole is entirely resolved into a fluid colourless oil, and a small portion of watery acidulous liquor, smelling strong of camphor; the bole at the same is reduced to a black sparkling powder being almost entirely deoxygenated. Clay, according to La Grange, produces the same effect. This oil of camphor, according to Kofegarten, is nearly colourless, has a peculiar odour like that of thyme and rosemary, and bears a close analogy to the essential oils. It is soluble in alcohol and separable unaltered from its solution by agitation with water. It forms favonules with the alkalies, and is easily volatilizable for the most part by a gentle heat. Nitric acid produces no other effect than tinging it of a reddish colour, and even a mixture of this acid with the concentrated sulphuric only deepens the colour of the oil still more, and brings it to a somewhat thicker consistence.

Both vinegar and carbonic acid will dissolve a small proportion of camphor. The muriatic and fluoric acids when in a state of gas take up a considerable quantity, but deposit nearly the whole by the contact of water. Concentrated sulphuric acid dissolves camphor largely even in the cold, but by the assistance of a moderate heat it takes up so much as to form a thick homogeneous mass, of a brown or black colour, and a sulphureous odour, which when warm is fluid, but coagulates by a moderate heat, and by evaporation is brought to a resinous consistence. This is soluble in alcohol, but is decomposed by water, the camphor being disengaged with little or no alteration, and the mixture now no longer exhaling a sulphureous but a camphoric odour. The action of oxymuriatic acid on camphorized sulphuric acid is remarkable: if one part of camphor is dissolved in eight parts of sulphuric acid, and this mixture is poured in a retort upon four parts of black oxyd of manganese and as much water, the result of a slow distillation of these materials will be acetous acid mixed with a small portion of undecomposed camphor.

Nitric acid, when somewhat concentrated, dissolves camphor in considerable quantities at the usual temperature. The solution is of a very dilute yellow colour, and separates by standing into two distinct liquids. The lower consists of a mixture of nitric and camphoric acids, the upper fluid is of the consistence of oil, and is called *acid oil of camphor*; it is a combination of camphoric and nitric acid. This oil is soluble in alcohol, but is decomposable with precipitation of the camphor by water or alkalies. The conversion of camphor into a peculiar acid was first observed by Kofegarten, and was afterwards more fully elucidated by La Grange.

The process of Kofegarten is the following: Put one part of camphor into a retort, with 12 parts of strong nitric acid, and distil it slowly to dryness: a large quantity of carbonic acid and nitrous gas is disengaged, and the acid in the re-

ceiver is covered with a thin stratum of acid oil of camphor; a small portion of camphor sublimes into the upper part of the retort, and the mass at the bottom of the vessel is camphor approaching to the state of a vegetable oxyd. It has no longer the peculiar odour of the original substance, and when laid on a hot coal it evaporates with somewhat of a resinous odour, but without undergoing combustion: it is soluble in alcohol but not in water. This oxygenated camphor by being twice distilled to dryness, with ten parts of nitric acid at each process, is converted to a white pulverulent salt, soluble in hot water, and which has obtained the name of *camphoric acid*.

The method of La Grange differs chiefly in requiring a smaller quantity of nitric acid. He takes one part of camphor and four of nitric acid, and distils the mixture by a very gentle heat; the acid that passes into the receiver being mixed with four parts more of fresh acid, is returned upon the matter in the retort and again distilled. This is repeated five several times with twenty parts of nitric acid in the whole, and the operation is known to be finished when the liquor in the retort crystallizes on cooling. The produce of camphoric acid by either of these methods does not much exceed one half of the camphor made use of.

Camphoric acid, when crystallized hastily, appears as a mass of white silvery filaments; but by slow cooling assumes the form of parallelepipedal or rhomboidal plates, which effloresce on exposure to the air. To the taste it is slightly sour and bitterish. It reddens syrup of violets, and tincture of litmus. It dissolves easily in alcohol and in hot water, but requires 200 parts of this latter fluid at the ordinary temperature for its solution. When heated it gives out a thick aromatic smoky, and is entirely dissipated; in close vessels it sublimes unaltered, if the heat is not too great. The alcoholic solution of this salt is not decomposed by water, a circumstance that distinguishes it from benzoic acid, to which it bears a considerable resemblance. It is soluble in the expressed and essential oils, and in the mineral acids, and forms a precipitate with the muriat and sulphat of iron.

Camphoric acid unites with the salifiable bases forming a genus of salts, the *CAMPHORATS*. Of these very little is known. The neutral and earthy camphorats, which are the only ones that have as yet been the subject of any experiments, are all decomposable by heat, except the camphorat of ammonia, which sublimes unaltered. When exposed to the blow-pipe, the acid burns off with a blue flame. The camphorats are decomposable with abstraction of the base by the mineral acids, and with abstraction of the acid by most of the metallic, barytic, and calcareous salts. The camphorats of lime, barytes, and magnesia, yield their acid to alcohol.

The use of camphor in the arts is to assist the solution of the resins in various menstrua. It is employed with success in cabinets of Natural History to prevent the approach of insects which appear to be stupefied and killed by the pungency of its odour. For its medical properties and application see the next article.

CAMPHOR, Medical uses of, and pharmaceutical preparations.

Camphor has long been considered as an article of high importance in the materia medica, and is in daily use for a great variety of purposes, in which its beneficial operation is unquestionable. Yet it is chiefly as an auxiliary that it is resorted to, and though a valuable medicine, it does not appear quite to deserve the very high encomiums that have been given to it by many eminent writers.

In a moderate dose, camphor when taken into the stomach, (mixed with some vehicle which will allow of its being divided and distributed over this organ) increases the real heat of the body, though its first effect is often a sensation

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tion of coldness. It soon produces a strong tendency to perspiration; but the pulse is not sensibly affected in quickness by a dose capable of producing copious sweat, and an elevation of spirits like the beginning of intoxication. In a febrile irritable state of body, accompanied with spasmodic affections of the muscles, camphor may be given with safety and advantage; and it acts very decidedly as an antispasmodic, and very materially assists the action of opium. Experience shews that the action of camphor is sudden and very transitory, resembling in this respect that of the essential oils, only it must always be remembered that on account of the extreme solubility of this substance in most of the animal fluids, unless it be very minutely divided, it will remain long unaltered in the alimentary canal; and thus the same effect may in fact be produced by the length of time in which it remains in contact with the organs, as if its operation were highly permanent.

Experiments have been made both on the human body and on other animals with regard to the effects of camphor in excessive doses, which shew it to be possessed of extremely active deleterious powers, and teach some caution in the use of this remedy. Camphor given internally to small animals, such as birds, cats, dogs, &c. produced severe effects in all. The first operation appeared to be that of an excessive acrid stimulus on the stomach, producing foaming at the mouth, violent convulsive twitchings over the body, sometimes with vomitings; accessions of fury in dogs and cats; symptoms resembling intoxication; and lastly, comatose stupor and death. On opening the body, the stomach was found violently inflamed, and the intestines dilated with wind and froth. Twenty four grains proved a pretty certain poison to cats. The effects of an over dose of this substance on the human body were accurately shewn by the experiments to this express object, which Dr. Alexander made on himself. On taking one scruple the pulse soon fell from 68 to 65: two scruples more gave a great and at first agreeable sense of warmth in the stomach, but soon followed by excessive anxiety and creeping of the flesh, nausea, giddiness, tremors, convulsions, loss of recollection, and delirium, coma and quickened pulse. On drinking warm water, much of the camphor came up from the stomach three hours after it had been taken, and with very speedy relief, and the whole of the formidable train of symptoms brought on by this rash experiment subsided readily and left no permanent inconvenience.

To insects and very small animals, the effluvia of camphor, even at a common temperature, is obviously excessively harassing, as they quickly avoid it; but if confined in a close vessel with a piece of camphor, it proves fatal to many species.

Camphor is a very powerful antiseptic; and from this and its stimulant powers, all the medicinal virtues attributed to it have been usually derived. Indeed, to the very great antiseptic power which it possesses, may be attributed the somewhat exaggerated praise which it has received as an internal medicine in the cure of typhus, and (so called) *putrid* fevers, in the fever attending local gangrene, and similar diseases; for its efficacy in these is certainly not comparable to that of other medicines. In the typhoid diseases attended with spasmodic motions of the limbs (at all times a most formidable symptom) camphor is peculiarly serviceable, and much assists the action of opium. In rheumatic complaints or other disorders where a copious sweat is wanted, there are few medicines so certain as a mixture of camphor and nitre, about five grains of the former, and from 15 to 20 of the latter, taken at short intervals.

A very common, and generally cordial and grateful drink, (besides being a good vehicle for other medicines), is the

mistura camphorata, or *camphor julep*, made by rubbing one dram of camphor first with a little spirit of wine to bring it to a powder, then with half an ounce of sugar, and adding a pint of boiling water. When cold, the water tastes strongly and pleasantly of the camphor, though almost the whole swims at the top unmixed; and so little camphor is dissolved that neither by evaporation nor by any other method can any visible quantity be extracted from the water. A very elegant preparation of camphor, often of singular use in spasmodic irritability of the stomach, and incessant vomiting, is a solution of camphor in water saturated with carbonic acid. If pulverized camphor is diffused in water in a Nooth's machine or any similar contrivance, the water as it takes up carbonic acid dissolves also a very small portion of the camphor, though it is doubtful whether it takes up in this way more than in the common camphor julep.

Almond emulsion with camphor dissolved in it is a much stronger solution of this substance than the former preparations, the almonds much assisting the solution of the camphor. One scruple of camphor, (rubbed to powder, with a drop or two of alcohol), two drams of almonds, one dram of sugar and half a pint of water, make the "*emulsio camphorata*." It is used for the same intention as the camphor mixture, and it is also much employed as a drink in strangury, difficult micturition, the ardor urinae of gonorrhoea, and other painful affections of the urinary organs. It is said that magnesia much assists the solubility of the camphor in this emulsion, and is besides often an useful addition as a medicine.

Camphor and opium are very frequently joined both in the liquid and solid form. The commonest liquid preparation of the two is the "*tinctura opii camphorata*," or "*elixir pargoricum*," a medicine of undoubted utility in coughs, oppression of breathing; and many other complaints; and perhaps of all others the commonest, (and we may add, one of the safest and the best) of the domestic medicines. Camphor is thought peculiarly to counteract the heating and unpleasant effects of opium, and, together, to determine gently to the skin, and to allay spasmodic irritation. They may be well combined in the form of pills, but to divide the camphor and increase its solubility, it should be rubbed down with a drop or two of alcohol, or spirit of ammonia. A bolus is, perhaps, a better form, and the solubility of camphor in the stomach is further increased by being triturated with gum arabic.

Camphor is largely employed as an external application, sometimes as a stimulant and antiseptic conjoined, as where it enters into the composition of the fomentations of aromatic herbs used in gangrene or sphacelus; sometimes as a stimulant and supposed discutient to indolent tumors, rigidity of tendons, and the like; sometimes as a simple stimulant, as for example, when used as a collyrium to chronic complaints of the eyes, &c.

Camphor for external use is dissolved either in oily or in spirituous menstrua. Olive oil dissolves it largely, especially when pulverized and assisted by a gentle heat. The solution is quite limpid, and often greenish. It is a very valuable application of itself, or when brought into a kind of soap by spirit of ammonia. Palm oil with camphor, makes a common and very excellent liniment of the stimulating and discutient kind. It is yellow and of the consistence of butter. Muriated ammonia in very fine powder, rubbed with camphorated palm-oil, makes a most active and valuable liniment.

Camphor is often mixed with resinous substances in the harder and compound plasters and unguents. Here the apothecary should be aware of the remarkable power of camphor

phor, in permanently softening most resinous substances, so that the proper consistence of a plaster will not allow more than a small dose of this substance. The strong, diffusible, and grateful odour of camphor is often of use in masking the unpleasant smell of other applications.

CAMPHORATA, in *Botany*, *hirsuta* (Bauh. pin.) *monspeliensium* (Bauh. hist.) See **CAMPHOROSMA** *monspeliaca*.

CAMPHORATA *glabra*, (Bauh. pin.) See **CAMPHOROSMA** *glabra*.

CAMPHORATA *africana*, *umbellata* (Comm. hort. 2. p. 79. tab. 40.) See **SELAGO** *corymbosa*.

CAMPHORATED, denotes a thing tinctured, or impregnated with **CAMPHOR**.

Spirit of wine camphorated, is a remedy frequently applied externally in cases of inflammations, &c.

CAMPHOROSMA, in *Botany*, (from *camphora* and *osm*, *smelling of camphor*.) Linn. gen. 164. Schreb. 221. Willd. 257. Lam. Illust. 236. Juss. p. 84. (Camphorata, Tourn. act. 1705.) Class and order, *tetrandria monogynia*. Nat. ord. *Holoraceæ*, Linn. *Atriplices*, Juss. *Chenopodeæ*, Vent.

Gen. Ch. *Cal.* perianth pitcher-shaped, four or five cleft half way down, compressed, permanent; segments acute; two opposite ones larger than the other, recurved. *Cor.* none. *Stam.* filaments four or five, thread-shaped, equal; anthers oval. *Pist.* germ egg-shaped, compressed; style thread-shaped, semibisid, longer than the calyx; stigmas acute. *Peric.* capsule one-celled, covered with the calyx. *Seed* one, oval, compressed, shining.

Ess. Ch. *Calyx* pitcher-shaped: two opposite segments larger. *Corolla* none. *Capsule* one-seeded.

Sp. 1. *C. monspeliaca*, Linn. Sp. Pl. Lam. Ill. Pl. 86. (Camphorata *hirsuta*, Bauh. pin. 486. Rai hist. 210. Tourn. Act. 1705. p. 313. Buxb. Cent. 1. p. 18. tab. 28. fig. 1. Camphorata *monspeliensium*, Bauh. hist. 3. p. 379. Lob. Adv. 174. and Ic. 403. Selago f. Camphorata, Lugd. 1201.) "Leaves linear-awl-shaped, hairy; flowers in close axillary clusters." *Root* perennial. *Stems* about a foot high, shrubby, branched; branches numerous, round, long, hairy, whitish at their summit. *Leaves* alternate or scattered, closely set, small, rather stiff. *Flowers* small, green, pubescent without, sometimes five-cleft. The leaves when rubbed between the fingers smell something like camphor. The whole plant abounds in a volatile oily salt, and is warm and stimulating. An infusion of it in a dose from half an ounce to an ounce and a half is said to be of service in the asthma. A native of a sandy soil in Tartary, Spain, and the south of France. 2. *C. acuta*, Linn. Sp. Pl. Pollich. pal. 4. 167. "Leaves awl-shaped, rigid, smooth." *Root* perennial, slender, spindle-shaped. *Stems* numerous, shrubby, decumbent, round, hairy, roughish, branched, from two or three inches to a foot in height; branches alternate. *Leaves* alternate, sessile, entire, ciliated at the base, small, pubescent, soft. *Flowers* small, sessile, axillary, growing two together; calyx roundish, hairy; segments five, ciliated; stamens five; longer than the flower; anthers roundish, yellow; germ egg-shaped, rather acute. Pollich. A native of dry sandy fields in the Palatinate, Italy, and Tartary. La Marck observes that he is unacquainted with this species, and that as *anthyllis altera* Italorum, quoted by Linnæus as a synonym, appears to him to belong to *stellera passerina*, he suspects that the same plant has been inserted twice in the Species Plantarum, under different names. But as *stellera passerina* is also described by Pollich, in his history of plants growing in the Palatinate, the conjecture of La Marck does not seem to be well founded. 3. *C. glabra*, Linn. Sp. Pl. Bauh. pin. 486. Dalech. hist. 1179. "Leaves some-

what three-sided, smooth, unarmed." A native of Switzerland. This species is obscure. Haller in the first edition of his Swiss plants, keeps it and *polycnemum arvense* separate, both under the name of *camphorata*; but in the second edition he puts the synonym of *camph. glabra* Bauh. pin. to his *polycnemum*. Reichard and La Marck complain that they could not find in Haller the synonym referred to by Linnæus. 4. *C. paleacea*, Linn. jun. Supp. 128. "Shrubby; branches spike-shaped, chaffy, hairy." An evergreen shrub, scarcely a foot high, regularly branched; branches alternate, covered with chaff; hairs, leaves, and flowers imbricated and intermingled, and all so small as to be scarcely discernible by the naked eye. *Chaff* membranous, white. *Leaves* elliptical, smooth, sessile. *Calyx* four leaved. *Petals* four, very short, ciliated, obtuse. *Stamens* four, scarcely longer than the calyx. *Germ* superior. *Style* capillary. *Stigma* simple. A native of the Cape of Good Hope. La Marck observes in Encyc. that he believes it to belong to a different genus; he has, nevertheless, continued it under *camphorosma*, in his Illustrations; although nothing can be more evident than its inconsistency with the generic character. Willdenow justly remarks that the flowers of all the species require a more accurate examination, and that the generic character cannot be considered as fixed. 5. *C. Pteranthus*, Linn. Mant. p. 41. Lam. Enc. vol. i. p. 523. Willd. Mart. (*Pteranthus dichotomus*, Forsk. Ægypt. 36. Lam. Ill. Pl. 764. Juss. 404. Vent. vol. iii. 534. *Louichea cervina*, l'Herit. Stirp. 1. p. 135. tab. 65. *Pteranthus echinatus*, Desfontaines flor. atlan. vol. i. p. 145. Poir. Enc. vol. v. p. 707.) "Much branched; peduncles sword-shaped, dilated; bractes crested." *Root* annual, fibrous. *Stems* herbaceous, jointed, dichotomous, or trichotomous below, and much branched above; lower branches in whorls, upper ones opposite. *Leaves* in whorls, linear, smooth, obtuse, unequal in size. *Flowers* in the fork of the stem, and at the summits of the branches, green, small; peduncles (common receptacle, Vent.) inversely conical, compressed, striated, hollow, trichotomous at their summit; pedicels (partial receptacles, Vent.) similar to the peduncles, each bearing seven flowers; one fertile in the centre, with three on each side, of which two are barren, and that between them fertile; calyx four-cleft; two opposite segments oblong, concave, terminated by a recurved point; the two others larger, furnished on each side near the summit with a crest or membranous wing; stamens short; filaments awl-shaped, a little united at their base; style bisid; stigmas simple. *Capsule* rather globular, one-celled, one-seeded, not opening. A native of Ægypt and of the kingdom of Tunis, where it flowers all the winter and in the beginning of spring. The French botanists have formed for it a distinct genus on account of its capsule, which does not open at the top, as in the other species. But unwilling to increase the number of genera without absolute necessity, especially in so lax a genus, we have followed Willdenow and Martyn in keeping it where Linnæus placed it. The description given by the Swedish naturalist is, however, by no means satisfactory: in the specific character, he seems to have mistaken the larger segments of the calyx for bractes. We have formed our description from those of Jussieu, Ventenat and Poir. compared with La Marck's figure.

CAMPHOROSMA, (Mor. hist. 3. p. 366. tab. n. fig. ult.) See **DRACOCEPHALUM** *canariense*.

CAMPHUYSEN, DIRK THEODORE RAPHAEL, in *Biography*, a painter of landscapes, cattle, and moon-lights, was born at Gorcum, in 1586, and having learned the art of painting from Diederic Govertze, soon not only equalled, but far surpassed his master. He studied nature with judgment and

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diligence; his pencil was remarkably tender and soft; his colouring a just representation of nature, and very transparent; and his perspective accurate and well contrived. His pictures, as he left off painting at the age of 18 years, are scarce, and fetch considerable prices. When he relinquished his profession, he became tutor to the sons of lord Nieuport, and was recompensed for his discharge of the trust with the office of secretary to that nobleman. The designs which he executed by drawing with a pen are highly valued. Pilkington.

CAMPI, MICHAEL, and BALTHASAR, two distinguished botanists of Lucca, flourished in the early part of the 17th century. Well instructed in the writings of Dioscorides, and of the Arabians, they compared the plants described by them, with those used in the shops under the same name, which in some instances they found to be erroneous. They also in their excursions over the Alps, discovered several plants not before known. The works published by them are, "Nuovo Discorso, &c." 1623, 4to. in which they examine some of the articles used in the composition of the Mithridate. "Del Balsamo," Lucca 1639, 4to. "Specilegio Botanico," 1654, 4to. in which they attempt to shew, that the cinnamon now used, is not the same as the plant described under that name by Dioscorides. Haller Bib. Bot.

CAMPION, EDMUND, a distinguished popish martyr in the reign of queen Elizabeth, was born at London 1540, and brought up at Christ's hospital. He was admitted a scholar of St. John's college at Oxford, in 1553, and having taken his degree of M. A. in 1564, entered into orders, and became an eloquent Protestant preacher. When queen Elizabeth visited the university in 1566, he delivered an elegant oration and kept an act in her presence, with great applause. In 1568, he went to Ireland, where he became a convert to popery; and upon being discovered in making profelytes, he was apprehended. However, he made his escape into England, and from thence into the Low Countries, and entered into the English college at Douay. At Rome he was admitted into the society of Jesuits; and having been sent by the general of the order into Germany, he at length settled at Prague, and for six years taught rhetoric and philosophy in the Jesuits' college. Having established his reputation for recovering to the church many persons who had separated from it, he was recalled to Rome, and deputed by Gregory XIII. in 1580, on the dangerous mission to England. Here he was zealous in his endeavours by his discourses and writings to make profelytes; and he procured to be printed at a private press, and industriously circulated at Oxford, a kind of challenge to the clergy, entitled, "Rationes decem oblatis certaminis in causa fidei, redditæ Academicis Angliæ." After he had for some time concealed himself, he was at length discovered in disguise at the house of a gentleman in Berkshire, and conveyed to the tower in procession, with a paper affixed to his hat, on which was an inscription, "Edmund Campian, a most pernicious Jesuit." Soon after, he was convicted of a charge of high treason, and in December, 1581, he was hanged and quartered at Tyburn. None have questioned his abilities, honesty, and moral character: and it has been also allowed, that he was well skilled in the learning of his age and profession. Among several works, written by him, were "An Universal Chronology" and a "Narrative of the Divorce of Henry VIII. from his Queen Catharine," both in Latin; and "Various Conferences on Religion held with Protestant Divines in the Tower of London." Whilst he was in Ireland he wrote in 1570, two books of the history of that kingdom, published by sir James Ware,

at Dublin, in 1633. Wood's Athen. Oxon. Nicholson's Histor. Library. Moreri.

CAMPICURSIO, in the *Ancient Military Art*, a march of armed men for several miles, from and back again to the camp, to instruct them in the military pace. This exercise was nearly akin to the *decurio*, from which it only differed, in that the latter was performed by horsemen, the former also by foot.

CAMPIDUCTORES, or CAMPIDUCTORES, in the *Roman Army*, were officers who instructed the soldiery in the discipline and exercises of war, and the art of handling their weapons to advantage. These are also sometimes called *campigeni* and *armidoctores*.

CAMPIDUCTOR, in *Middle Age Writers*, signifies the leader or commander of an army, or party.

CAMPIGLIA, in *Geography*, a town of Italy, in the duchy of Tuscany; 26 miles S. of Volterra.

CAMPILLO, a town of Spain, in the county of Seville; three leagues W. of Antequera.

CAMPION, FRANÇOIS, in *Biography*, one of the claimants to the invention of *La regle de l'octave*. It is recorded in Walther, that besides several useful elementary tracts for the Theorbo and Guitar, in 1705, he published a treatise on accompaniment and composition, according to the rules of the octaves, a work generally useful for transposition, to all those who study fingering and stringed (keyed) instruments, or even a single base part, which it will inform them how to figure.

CAMPION, in *Botany*. See AGROSTEMMA, CUCUBALUS, LYCHNIS, and SILENE.

CAMPION, in *Geography*, a town of Tartary, which was the capital of the kingdom of Tangut, or of the country lying immediately to the N.W. of the Chinese province of Shenfi, and formerly remarkable for being a place through which the caravans passed in the road from Bucharra to China. It is distant 60 miles N. from the great wall of China. N. lat. 40° 25'. E. long. 104° 53'.

CAMPIONI, in *Biography*, an agreeable French composer of the Italian school, student in 1770 at Sienna; whence removing to Florence, he was taken into the service of the grand duke, and composed a Te Deum for the birth of his imperial highness's eldest daughter, full of curious canons and other ingenious contrivances, which was performed by a band of 200 voices and instruments. But though this composition was with propriety written *alla Palestrina*, his printed trios were in the modern Italian style, and in great favour in England, for more than 10 years, during the middle of the last century. They were in an easy and graceful taste, and pleased universally till the superior force and genius of the elder Stamitz and Boccherini, created new wants and expectations.

CAMPISTRON, JOHN GUALBERT, a French dramatic writer, was born at Toulouse in 1656, and manifested an early taste for poetry. Being discouraged from indulging it by his friends, he abruptly left them, and went to Paris, where he put himself under the direction of Racine. His first compositions were two tragedies, entitled "Virginnia" and "Arminius," which were followed by two others of superior merit and more permanent reputation and popularity, viz. "Andronicus" and "Alcibiades." He was recommended by Racine to the duke of Vendôme, as a proper person for composing a new opera for a magnificent festival which he was preparing to give to the dauphin. The piece produced on this occasion was the heroic pastoral of "Acis and Galatea," which being the means of introducing him to the duke, laid the foundation of his fortune. The duke, engaged by his talents for conversation and conviviality,

ality, took him as a companion in his campaigns; and advanced him to several offices of honour and emolument. The circumstance by which he contributed to the advancement of Alberoni, has been mentioned under that article. Campistron, tired at length, both of the camp and the court, withdrew to his native city, of which he was appointed, in 1701, "Capitoul," or chief magistrate, and in the same year he was admitted a member of the French academy. In 1710 he married, and passed the remainder of his life in the circle of his family and friends. His death was occasioned by an apoplexy in 1723. Besides the dramatic pieces already mentioned, he published several others, among which are his "Phocion," "Adrian," "Tiridates," "Phraates," and "Jaloux defabulé;" and these contributed to support the reputation of the French theatre, though in an inferior degree, after it had lost Corneille and Racine; neither of whom he could rival. His style, however, was pure, natural, and sometimes elegant; but his distinguishing excellence consisted in the disposition of his plans, the modelling of his characters, and the knowledge of stage-effect. Nine editions of his "Theatre" were printed at Paris during his life; but the last and best was published since his death, in 1750, in 3 vols. 12mo. His brother, Louis Campistron, was a Jesuit, and cultivated French poetry. He also wrote funeral orations on the death of Louis XIV. and the dauphin. He died in 1733, aged 77. Moreri. Nouv. Dict. Hist.

CAMPIPARS. See CHAMPART.

CAMPITÆ, in *Church History*, an appellation given to the Donatists on account of their assembling in the fields for want of churches. For a similar reason, they were also denominated *Montenses* and *Rupitani*.

CAMPITELLO, in *Geography*, a town of the island of Corsica; 14 miles S. of Bastia.

CAMPO, a town of Italy, a fief of the empire, in the state of Genoa; 13 miles N.W. of Genoa.

CAMPO Basso, a city of Naples, and capital of the Molise,

seated in a fertile plain, producing all the necessaries of life. The air is salubrious, and the inhabitants, estimated at about 6000, carry on a considerable trade in articles of cutlery.—

C. *Fosso*, a town of Naples, in the province of Abruzzo Ultra.

—C. *Liatto*, a town of Naples, in the county of Molise; 14 miles E. of Molise.—C. *Maggiara*, a town of Naples, in the province of Basilicata; 14 miles S.E. of Acerenza —

Alfo, a town of Italy in the Tortonese, belonging to Piedmont.—C. *Marino*, a town of Naples, in the province of Capitanata; 3 miles S.E. of Termoli.—C. *Marone*, a town of Genoa, deriving its name from the quantity of mulberries growing in its vicinity; 11 miles N.N.W. of Genoa.—C.

Mayor, a fortified town of Portugal, in the province of Alentejo, containing about 5300 inhabitants; 10 miles N.W. of Badajos in Spain. N. lat. 38° 50'. W. long. 7° 24'.—

C. *Marto*, a place of Italy, in the duchy of Piacenza, near which Hannibal is said to have defeated the Romans.—C. *St. Pietro*, a town of the state of Venice, in the Paduan; 18 miles N. of Padua.

CAMPOBELLO, a town of Sicily, in the valley of Mazara; 14 miles N.E. of Girgenti.

CAMPO-BELLO, a long and narrow island on the east coast of Washington county, in the district of Maine, in America, and the north-eastermost of all the islands of the district. The north end of this island lies in about N. lat. 44° 48'. The south end is 5 miles north-westerly from Grand Manan island.

CAMPOCHIARO, a town of Naples, in the county of Molise; 11 miles S. of Molise.

CAMPOLI, a town of Naples, in the province of Abruzzo Ultra; 3 miles N. of Teramo. N. lat. 42° 38'. E. long. 13° 55'.

CAMPOLONGO, ÆMILIUS, in *Biography*, born at Padua in 1550, and applying early to the study of medicine, attained such eminence as to be noticed, and employed by the first families in the city; and in 1578 to be appointed professor in that science, an office he continued to hold till the time of his death in 1604. The principal of his works are, "De Variolis, et de Arthritide," 4to. 1586; taken principally from the works of Galen, in which he was intimately conversant. "Methodi Medicinales," conjointly with Alb. Bottono, 8vo. "Nova cognoscendi Morbos Methodus," 1601, 8vo; and after his death, from his papers, "De Lue Venerea, Libellus." Patav. 1625, fol.; and "De Vermibus, de Uxoris Affectibus, et de Morbis cutaneis," 1636. Astruc de Morb. Ven. Haller. Bib. Med.

CAMPOMANESIA, in *Botany*. Bosc Nouveau Dict. Flor. Peruv. Class and order, *icosandria monogynia*. Nat. ord. *Hesperideæ*, Linn. *Myrti*, Juss.

Gen. Ch. *Cal.* perianth five-cleft, permanent: segments egg-shaped. *Cor.* petals five, egg-shaped, concave. *Stam.* numerous, inserted on the calyx. *Pist.* germ inferior: style inclined: stigma target-shaped, umbilicated. *Peric.* berry globular, compressed, one celled, crowned with the calyx. *Seeds* about twelve, kidney-shaped, attached to a fleshy receptacle. A tree found in Peru, of which no farther details are given. Bosc observes, that it is an intermediate genus between *Myrtus* and *Psidium*, and that it appears to agree with *Decaspermum*, a genus formed by Forster, for a plant which has since been received as a *Psidium*. The present plant, perhaps, ought to be admitted into the same genus. The form of the style, and the manner in which the seeds are attached to the receptacle, seem to constitute the only difference. To ascertain what ought to be the precise boundaries of a genus, and to determine what particulars, in the structure of the parts of fructification, should be considered as solid generic distinctions, is a problem which has not hitherto been, and probably may not be, resolved for many ages yet to come.

CAMPORA, in *Geography*, a town of Naples, in the Principato Citra; 15 miles N.W. of Policastro.

CAMPRA, ANDREW, in *Biography*, a French musician, born at Aix, in 1660, settled at Paris in 1685, and first became known by the composition of motets for the churches and private concerts. He afterwards devoted his talents to compositions for the opera, and almost rivalled the celebrated Lulli. He set a number of ballets and serious operas, which are still occasionally performed; and also published various kinds of music, which have been held in estimation. The king appointed him music-master of the royal chapel, and gave him a pension. He died at Versailles in 1744. Moreri.

CAMPREDON, in *Geography*, a town of Spain, in the province of Catalonia, at the foot of the Pyrenees, taken by the French, who destroyed its fortifications in 1691, and again in 1704; 27 miles N.N.W. of Gerona. N. lat. 42° 20'. W. long. 1° 56'.

CAMP-SHEETING, *CAMP-sheet*, or *CAMPSTEAD*, in *Inland-Navigation*, denotes a facing of piles and pinks in the front of banks or wharfs, to prevent the banks being worn away.

CAMPSIS, in *Botany*, (Loureiro). See INCARVILLEA.

CAMPTON, in *Geography*, a small township of America, in Grafton county, New Hampshire, situate on the east bank of Pemigawasset, the north head water of Merrimack river; 67 miles N.W. of Portsmouth. It was incorporated in 1761, and contains 395 inhabitants. N. lat. 43° 51'.

CAMPUGIALI, in *Geography*, a town of the duchy of Tuscany; 9 miles W.N.W. of Arezzo.

CAMPUS, in *Antiquity*, a field or vacant plain in a city

not built on, left vacant either on account of shews, combats, exercises, or other uses of the citizens.

CAMPUS Maii, in *Ancient Customs*, an anniversary assembly of our ancestors, held on May-day; where they confederated together for defence of the kingdom against all its enemies.

CAMPUS Martius, a large plain field in the suburbs of ancient Rome, lying between the Quirinal and Capitoline mounts, and the Tiber; thus called because consecrated to the god Mars, and set apart for military sports and exercises, to which the Roman youth were trained; as the use and handling of arms, and all manner of feats of activity. Here the races were run, either with chariots or single horses; here also stood the *villa publica*, or palace for the reception of ambassadors, who were not permitted to enter the city. Many of the public *comitia* were held in the same field, part of which, for that purpose, was cantoned out. The place was also nobly decorated with statues, arches, columns, porticos, and the like structures.

CAMPUS Martius is also used in a more general sense by *Middle Age Writers*, for any large plain open place near a great city, wherein the inhabitants were trained to the exercise of arms. Of such we find mention at Verona, Tries, Dornic, and even Constantinople.

Among the French, *campus martius* was an appellation given to the yearly assemblies of the people called by the kings, either for enacting new laws, or deliberating on the great affairs of the nation. They were thus denominated, either because usually held in the month of March, or in imitation of the *campus martius* of the Romans, which was allotted for the like use. In aftertimes they were called *campus majus*, and by corruption, *campus madius*, and *magius*, because the time of holding them was altered by Pepin to the month of May. Under the third line of kings, their assemblies took the denomination of states-general, *états généraux*.

CAMPUS Sceleratus, a place without the walls of ancient Rome, where the vestals, who had violated their vow of virginity, were buried alive. See *BURYING alive*.

CAMPYLUS, in *Botany*. Bosc. Nouv. Dict. Class and order, *pentandria monogynia*.

Gen. Ch. *Cal.* perianth tubular, hairy, tubercled: border five-cleft; segments unequal. *Cor.* monopetalous, tubular, bilabiate: upper lip awl-shaped; lower lip egg-shaped. *Stam.* filaments five, unequal. *Pist.* germ superior: stigma five-lobed. *Peric.* capsule nearly globular, five-celled, many-seeded.

Eff. Ch. Capsule five-celled. Corolla bilabiate. A shrub. Stem nearly simple, climbing. Leaves heart-shaped, acute, entire, hairy, petioled, sometimes alternate. Flowers reddish white, in long, terminal, zig-zag racemes; bractes three-lobed. A native of dry mountains in China.

CAMRUP, in *Geography*, a district of Asam, (which see) on the side of Dacshincul, situate between three high mountains, at the distance of four days' journey from Ghergong. It is remarkable for bad water, noxious air, and confined prospects. It was the part to which the raja banished those of his subjects with whom he was angry.

CAMTOOS, a river of southern Africa, on the south coast of the colony of the Cape of Good Hope, formed by a collection of waters from the same part of the country with those of the GAURITZ river (which see), but somewhat more easterly. It falls into a wide bay of the same name, in which the only secure anchorage is opposite to the mouth of a small stream called the "Kromme," or crooked river. Though Camtoos river, just within the mouth, is a wide basin, deep enough to float a ship of the line, yet the bar of sand across the mouth is fordable upon the beach at high water, and frequently dry at low water. Barrow's Africa, vol. ii.

CAMUDOLANUM, in *Ancient Geography*. See **CAMALODUNUM**.

CAMUL, in *Geography*, a town of Tartary, at the extremity of the kingdom of Cialis, and on the borders of that of Tangut. N. lat. 37° 15'. E. long. 98° 5'.

CAMULODUNUM, in *Ancient Geography*. See **CAMALODUNUM**.

CAMUNIUM, in *Botany*. See *MURRAYA exotica*.

CAMUNLODUMUM, in *Ancient Geography*, a town of Albion, assigned by Ptolemy to the Brigantes, and placed by Horsley at Gretland, near the river Calder, in Yorkshire; but Camden and Baxter place it near Almondbury, about six miles from Halifax, on the same river. Roman antiquities have been found at both these places, and there are still visible vestiges of walls and ramparts. It seems to have been the same with the Cambodunum of the Itinerary of Antonine in the second rout, between Calcaria or Tadcaster, and Manucium or Manchester.

CAMURI, in *Ichthyology*, one of the synonymous names of **DIDON HYSTRIX** among old writers.

CAMUS, probably derived from *καμψω*, *I bend*, a person with a low, flat nose, hollowed or sunk in the middle. The Tartars are great admirers of *camus* beauties. Rubruquis observes, that the wife of the great Genghis Kan, a celebrated beauty, had only two holes for a nose.

CAMUS, JOHN-PETER, in *Biography*, an eminent French prelate, was born at Paris in 1582, and nominated by Henry IV., on account of his distinguished reputation, to the bishopric of Bellay, before he had attained the canonical age, to which he was consecrated in 1609, having previously obtained a dispensation from the pope. His attacks on the Mendicant orders, for their indolence and relaxed discipline, both from the pulpit and the press, were so acrimonious and severe, that the monks applied to cardinal Richelieu, in order to obtain a cessation of hostilities. His mode of attack, and style of preaching, may be discovered in the following passages, extracted from his sermons. "Fathers," says he, in a discourse delivered before the Cordeliers on St. Francis's day; "Admire the greatness of your saint; his miracles surpass those of the Son of God. Jesus Christ, with five loaves and three fishes, only once in his life, fed 5000 persons: St. Francis, with an ell of cloth, by a perpetual miracle, feeds daily 40,000 sluggards." "My friends," such was his delicate satire on another occasion, "a young gentleman is recommended to your charity, who is not rich enough to make a vow of poverty." The bishop, with a view of checking the ardour for reading romances, which prevailed in his time, and of directing it to some useful purpose, composed a number of rival works of a pious nature and tendency, which in some degree answered the purpose. After performing his episcopal duties with zeal and diligence for 20 years, he resolved to withdraw from the world; and having obtained leave to resign his bishopric, he retired first to the abbacy of Aulney, and afterwards to the hospital of Incurables at Paris, where he died in 1652, after refusing two considerable bishoprics. Camus was distinguished by a lively and warm imagination; and he composed with wonderful facility, in a style that was partly grave and partly burlesque, abounding with singular metaphors and images, often striking and sometimes ludicrous. He is said to have written 200 volumes, consisting of homilies and tracts, moral and devotional, pieces against the monks, pious novels, pastoral directions, &c. His works, that are now read are, "L'Esprit de S. François de Sales," 6 vols. 8vo. reduced to one by a doctor of the Sorbonne; and "L'Avoisinement des Protestans avec l'Eglise Romaine," republished in 1703 by Richard Simon, under the title of "Moyens de reunir les Protestans avec l'Eglise Romaine." Simon asserted, that Bossuet's exposition

position of the Catholic faith was no more than this work in a new dress. Moreri. Nouv. Dict. Hist.

CAMUS, STEPHEN LE, a French prelate, distinguished by his penitence, mortification, and attention to the duties of his profession, was born at Paris in 1632, and became a doctor of the Sorbonne in 1650. In early life he was borne away by the torrent of court dissipation; but resolving on reformation, he was nominated by the king in 1671, after having been his almoner for several years, to the bishopric of Grenoble. His general conduct corresponded to the outward tokens of penitence which he manifested. "He always wore a rough hair-shirt and lay upon straw. He rose at two in the morning, recited his breviary, read the Scriptures, and at five called up a domestic who wakened the others. At half past five he read the common prayers, recited prime at six, and then said mass. He then retired to his closet till nine, when he gave audience. At eleven he dined with his household. His chaplain sat next him; and at another table were his steward and domestics. One of the lacqueys read. To the prelate were served legumes only, with a small measure of wine, half of which was reserved for the dessert. He went to rest at eight. Such was the mode of living of this man, who was a prince as well as a bishop." Some time before his death, when his bodily infirmities increased, an order was procured from the pope to add fish and flesh to his diet. In visiting his diocese, for which he devoted three months in every year, he commonly travelled on foot; and visiting 100 parishes in a year, he completed his tour of the whole in three years. He everywhere preached with the same zeal, and distributed alms to the utmost extent of his revenue. He founded a number of charitable establishments. In 1686 pope Innocent XI., from a mere regard to his virtues, advanced him to the cardinalate. He died in 1707, and made the poor his heirs. His publications were Pastoral Letters to his Clergy, a collection of excellent Synodal Ordinances, and a Dissertation in proof of the perpetual virginity of the virgin Mary. Moreri.

CAMUS, in *Ancient Geography*, a town of Asia, placed by Polybius in Cælesyria.

CAMYROS, in *Ancient Geography*. See CAMIRO.

CAN, in *Sea-Language*.—A pump's *can*, is a sort of wooden jug or pitcher, wherewith seamen pour water into pumps to make them work.

CAN-buoy. See BUOY.

CAN-hook, an instrument used to sling a cask by the ends of the staves: it consists of a broad and flat hook fixed to each end of a short rope, and the tackle which serves to hoist or lower it is fastened to the middle of the rope.

CANA, in *Entomology*, an European species of APIS, of a grey colour, with the segments of the abdomen edged with whitish. Muf. Lefk.

CANA, in *Ornithology*, a species of MOTACILLA, of a cinereous colour; with the quill feathers edged with whitish; tail feathers black, the exterior ones nearly all white. Gmel. &c.

Obs. This is the grey-throated warbler of the Arctic Zoology. Buffon calls it Figuier cendré à gorge cendrée. It inhabits Louisiana.

CANA, in *Ancient Geography*, the name of two cities of Galilee in Palestine; one called by Jerom *Cana the Greater*; the other, *Cana the Lesser*, or commonly *Cana of Galilee*. The former is mentioned by Joshua (chap. xix. 28.) and was situated in the tribe of Asher; the latter, which is more frequently mentioned in the sacred writings, (See John II. i. 11. iv. 46. xxi. 2.) was seated in the tribe of Zebulun, N.W. of the sea of Galilee or of Tiberias, or

the lake of Gennefareth, on the confines of the upper and lower Galilee. This was the country of the apostle Simon, hence called the Canaanite (Matt. x. 4.) and of Nathaniel (John xxi. 2.); here Jesus wrought his first miracle; and as it was situated to the north of Capernaum, he is said to have gone down from Cana to this city; and after his return thither, the nobleman whose son was sick at Capernaum visited him there. It is of this Cana that Josephus speaks in his Life: p. 1005 and 1029.

CANA, or KANAH, a town of Palestine in the tribe of Ephraim, according to Eusebius and Jerom; and also a river of the same name on the western limit of the territory of the Ephraimites. Josh. xvi. 8. xvii. 9.

CANA, a promontory of Æolia, with a small town and mountain adjoining to it, at the termination of the bay of Adramyttium.

CANA, a town in Cælesyria. See CANATH.

CANA, in *Geography*, one of the smaller western islands of Scotland, about 8 miles S.W. from the island of Skye. N. lat. 57° 49'. W. long. 6° 40'.

CANA, EL, a town of Asiatic Turkey, in the province of Aladulia; 36 miles S. W. of Malatia.

CANAAN, in *Scripture Biography*, the fourth or youngest son of Ham, according to the order in which his name is introduced in Genesis, ch. x. 6. The Hebrew word כנען is derived from כנע, to *humble* or *abase*, and with the נ *nun* servile it denotes a *merchant* or *trader*, as the Canaanites or Phœnicians were. If we join the כ and נ, or *ch* and *n* into one syllable, and pronounce it as the Jews do, the word will be Chnaan, and it will more nearly resemble the Chna of Sanchoniatho and Stephanus Byzantinus. The time of his birth and the length of his life are not known; but some have supposed that he was born in the ark during the period of the deluge, and it has been fancifully said that he was a wicked man, because he was the fruit of an unseasonable incontinence. The irreverent action of Ham in discovering the nakedness of his father Noah was retaliated on Canaan. To this purpose Noah, with the spirit of prophecy, pronounces his malediction on this branch of his posterity, "Curfed," says he, "be Canaan; a servant of servants shall he be unto his brethren." Gen. ix. 25. As this curse was denounced, not against Ham the immediate transgressor, but against his son, who does not appear, from the words of Moses, to have been at all concerned in the crime, many conjectures have been employed to solve this difficulty in the sacred history. Some commentators apply the term כנען, or younger son in ch. ix. 24. to Canaan; and imagine that he joined with his father Ham in this mockery and insult upon Noah; and the Jewish rabbins have a tradition, that Canaan was the first who saw Noah in this posture, and then went and called his father Ham and concurred with him in his act of irreverence. Origen in Genes. p. 33. vol. ii. ed. Benedict. Bocharti Phaleg. l. iv. c. 37. col. 308. But this is a very arbitrary and unfounded method of interpretation; because no previous mention was made of Canaan, and of what he had done, but only of Ham the father of Canaan; and of him, therefore, the phrase of "little son" or "youngest son" must be understood. Others have alleged, that this curse was so far from being pronounced upon Canaan for his father Ham's transgression that it was not pronounced for his own, nor was it executed several hundred years after his death. It is in reality to be understood not so properly of Canaan, as of his descendants, the Canaanites. Accordingly, it is said, that God, foreseeing the wickedness of this people, which began with their father Ham, and greatly increased in this branch of his family, commissioned Noah to pronounce a curse upon them, and to devote them to the

the servitude and misery, which their more common vices and iniquities would deserve. It is added, that this account was written by Moses for the encouragement of the Israelites, to support and animate them in their expedition against a people, who by their sins had forfeited the divine protection, and were destined to slavery from the days of Noah.

Some biblical critics have proposed to correct the text, supposing that Canaan is here erroneously placed for Ham, which is the reading of the Aldine edition of the LXX. and of 7 of Holmes's MSS. Others suppose that *חם אבי*, *Ham the father of*, are wanting before Canaan, and supply them accordingly; partly from the Arabic version *كنعان ابن*, and partly from the rules of Hebrew metre, laid down by bishop Hare; *חם אבי* being necessary to fill up the verse. But neither of these authorities, says Dr. Geddes, is sufficient to justify an alteration in the present text, in which there is no variety of reading either in the Samaritan or Hebrew copies, and with which all the other ancient versions perfectly agree. Besides, if this alteration were allowed, it would not much mend the matter; for if Ham was only to be cursed, why curse him under the denomination of the father of Canaan. The text, in Dr. Geddes's opinion, is sufficiently clear as it stands; and highly expressive of what we may suppose to have been the feelings of Noah on this occasion. On awakening, he learns that Ham had used him most irreverently, while his other sons had shewed him that filial regard which was due to such a venerable father. To express his indignation at so infamous a conduct, he curses Ham in his progeny, and in *him* of his progeny, who was, probably, most dear to him, as being his youngest son, perhaps just then born; and whose very name, which imports the idea of depressive humiliation, might readily offer a paronomasiacal allusion, so common in the maledictions and benedictions of the patriarchs. Dr. Geddes proceeds with reflections which we can by no means approve, and which, in our opinion, are altogether unnecessary to vindicate this part of the Scripture history. "Whether this malediction," he says, "were prophetic or imprecatory; whether it were really made by Noah, or whether the whole be not a postliminious tale, contrived by the Hebrew historiographer for the purpose of throwing an odium on the Canaanites, and justifying the conquest of their country; are points which I mean not now to discuss: but it is pretty clear, that the story, true or false, is here introduced, to pave the way for a more special command from heaven to conquer and extirpate the Canaanite nations." See CANAANITES.

The curse pronounced by Noah on Canaan was peculiar to this son of Ham and his posterity, and does not seem to have extended to the rest of his brethren. And, indeed, considered as a prophecy, the declaration that Canaan "should be a servant of servants to his brethren," seems to have been wholly completed in him, though its accomplishment was distant and gradual. It was completed with regard to Shem, not only because a considerable part of the seven nations of the Canaanites were made slaves to the Israelites, when they took possession of their land, as part of the remainder of them were afterwards enslaved by Solomon; but also by the subsequent expeditions of the Assyrians and Persians, who were both descended from Shem; and under whom the Canaanites suffered subjection, as well as the Israelites; not to mention the conquest of part of Canaan by the Elamites, or Persians, under Chedorlaomer, prior to them all. With regard to Japheth, we find a completion of the prophecy, in the successive conquests of the Greeks and Romans in Palestine and Phœnicia, where the Canaan-

ites were settled; but especially in the total subversion of the Carthaginian power by the Romans; besides some invasions of the northern nations, as the posterity of Thogarmah and Magog: wherein many of them were, probably, carried away captive. "Egypt," says bishop Newton, "was the *land of Ham*, as it is often called in Scripture; and for many years it was a great and flourishing kingdom; but it was subdued by the Persians and afterwards by the Grecians, and it has ever since been in subjection to some or others of the posterity of Shem or Japheth. The whole continent of Africa was peopled principally by the children of Ham; and for how many ages have the better parts of that country lain under the dominion of the Romans, and then of the Saracens, and now of the Turks? In what wickedness, ignorance, barbarity, slavery, misery, live most of the inhabitants? And of the poor negroes how many hundreds every year are sold and bought like beasts in the market, and are conveyed from one quarter of the world to do the work of beasts in another?" "Nothing," says this prelate in the close of his account of this prophecy, "can be more complete than the execution of the sentence upon Ham as well as upon Canaan."

Canaan is supposed to have lived and died in a country called after his name. His posterity was very numerous. His eldest son Sidon founded the city of Sidon, and was the father of the Sidonians and Phœnicians. His ten other sons were the fathers of as many tribes, dwelling in Palestine and Syria: viz. the Hittites, Jebusites, Amorites, Girgashites, Hivites, Arkites, Sinites, Arvadites, Zemarites, and Hamathites.

Canaan seems to have been known to the ancient heathens. Sanchoniatho occasionally mentions Cnaa, who is known to be Canaan, as the first Phœnician. There is reason to think, says the learned Bryant, that by the Egyptians and other neighbouring nations, Canaan was expressed Cnaa. This by the Greeks was rendered *χναας*, and *χνας*; and in later times *χνα*, Cna. Bryant adds, that, by prefixing the term *Υκ*, *uc*, which is to be found in the composition of many words, particularly such as are of Amorite original, Cnas or Canaan, was styled Uc-nas, and the Gentile name or possessive was Uc-cnaos, *Υκ κναος*, which was changed by the Greeks into *Κυκνηος*, or Cucneus; and from *Υκ Κνας* they formed *Κυκνος*. Hence he derives the Cycnus of Lucian and the ancient poets, who was represented as the brother of Phaethon and transformed into a swan. With respect to Cycnus and his brotherhood, the vocal ministers of Apollo, the story, as he conceives, which is told of them undoubtedly alludes to Canaan, the son of Ham, and to the Canaanites, his posterity. Accordingly he observes, that the swan was the ensign of Canaan, as the eagle and vulture were of Egypt, and the dove of Babylonia: and that, wherever we may imagine any colonies from Canaan to have settled and founded temples, there is some story about swans. The Canaanites, it is said, wherever they came, introduced their national worship; part of which consisted in chanting hymns to the honour of their country god, who was the same as Apollo of Greece; and on this account Lucian, in compliance with the current notion, says, that the Cycni were formerly the assessors and ministers of that deity. By this, says Bryant, we are to understand, that people of this denomination were in ancient times his priests. Mede's works, vol. i. p. 378. Anc. Un. Hist. vol. i. p. 88. Geddes's Crit. Rom. vol. i. p. 76. Bishop Newton on the Prophecies in his works, vol. vii. p. 11—23. 8vo. Leland's Deistical Writers, vol. iii. p. 254, &c. Bryant's Anal. Anc. Mythol. vol. i. p. 369, &c.

CANAAN, *land of*, in *Scripture Geography*, so named from Canaan,

C A N A A N.

Canaan, the son of Ham, whose posterity possessed this country as well as Egypt, or Mizraim, lies in the western part of Asia, and extends from about 31° to $33^{\circ} 20'$ N. lat. and from $34^{\circ} 50'$ to $37^{\circ} 15'$ E. long. It was bounded, to the north, by Cæle-Syria, or the mountains of Libanus and Anti-Libanus; to the west, by the Mediterranean sea; to the east, by Arabia Deserta; and to the south and south-west, by Arabia Petræa and Egypt. Its extent has been variously ascertained; but from the latest and most accurate computation, it was about 200 miles from north to south, that is, from Dan or Cæsarea-Philippi to Beer-sheba, and about 100 miles in breadth. According to this reduced extent, if we consider its extraordinary fertility, the number of its inhabitants, and the many cities and villages which it contained, it was so far from being an inconsiderable spot of ground, as some have misrepresented it, that, exclusive of what it was in the reigns of David and Solomon, (Ezra, iv. 20.) and many ages after, it must have been always regarded as one of the most opulent and considerable kingdoms of the East; and it must be allowed, that the Israelites, according to the acknowledgment of the king of Tyre, (1 Kings, v. 7.) were a "great people." Indeed, the description of its wealth, power, and population, seems very extraordinary; even allowing it to have been cultivated with the utmost diligence, by men well acquainted with every branch of agriculture.

Before the Israelites obtained the possession of it, Moses describes it as a country singularly fertile and productive. See Deut. viii. 7, &c. Its wonderful fecundity was owing to several circumstances; such as the excellent temperature of the air, which was never subject to excessive heats or colds, the regularity of its seasons, especially the former and latter rain, and the natural fatness and fertility of its soil, which required neither dunging nor manuring. It was famous for its large and delicious grapes, for its palm-trees, and its dates, for its balsam shrub which produced the celebrated balm of Gilead, for the constant verdure of its fruit trees, and for its citrons and its oranges. Its vines yielded grapes twice, and sometimes thrice, in a year; its honey was abundant; its inhabitants cultivated sugar-canes with great assiduity; and their cotton, hemp, and flax, were mostly of their own growth and manufacture. Its vicinity to Libanus afforded them an ample supply of cedars, cypresses, and other stately and fragrant trees. They fed large herds of cattle, both great and small, and their hilly country afforded them not only variety and plenty of pasture, but also of water, that descended thence into the vallies and low lands, which it fertilized. But the most fertile pasture-grounds were on each side of the river Jordan, besides those of Sharon, or Saron, the plains of Lydda, Jamnia, and some others, which were then justly famed for their fecundity. As for fish, their rivers, the lake of Tiberias, and the Mediterranean sea, afforded great plenty and variety. The lake Asphaltites yielded abundance of salt, with which they seasoned and preserved their fish, and which Galen affirms to have been preferable to any other. It ought further to be considered, that the country was then inhabited by an industrious people, who knew how to improve every inch of this land, and had made even the most desert and barren places to yield some kind of produce, by proper care and manure, so that the very rocks, which now appear quite naked, produced corn, pulse, or pasture; for every little hillock was formed into a terrace covered with mould, which, through the laziness of succeeding proprietors, has been since washed off by rains and storms. The fecundity of Palestine hath been extolled even by Julian the apostate, a sworn enemy to Jews and Christians, who frequently, in his Epistles, men-

tions the perpetuity, as well as excellence and great abundance of its fruits and produce. The visible effects of divine displeasure, which this country has felt, not only under Titus Vespasian, but much more since that emperor's time, in the inundations of the northern barbarians, of the Saracens, and of the more cruel and destructive Christians, during the holy war, and in the oppression it now feels under the Turkish yoke, are causes more than sufficient to have reduced the far greater part of the country into a mere desert. If we were to judge by its present appearance, nature itself has rendered it incapable of cultivation.

The land of Canaan was divided into two unequal parts, of which the western was considerably the greater, by the river Jordan, which rises in the mountains of Hermon (a branch of the mountains of Libanus), and running south through the lake of Gennesareth, or the sea of Tiberias and Galilee, after a course of 150 miles, loses itself in the Asphaltite Lake, or the Dead Sea. See ASPHALTITE Lake.

The country to the east of Jordan was given to the tribes of Reuben, Gad, and the half tribe of Manasseh; the kingdom of Moab lay to the south; the kingdom of Ammon to the east of Gad; and the mountains of Hermon bounded Manasseh to the north-east, beyond which lay Trachonitis and Ituræa. West of the Jordan, to the north, were placed Naphtali on the river, and Asher, which bordered on Phœnicia and the Mediterranean. Zebulun and Issachar had inland districts; but the other half tribe of Manasseh and Ephraim reached from the sea to the river. Dan (upon the coast) and Benjamin, were south of Ephraim, and north of Simeon and Judah. The country allotted to Simeon bordered upon the Mediterranean, and extended to Egypt; but the Philistines, who inhabited the coast, were never entirely driven out of their possessions. The country of Judah bordered upon the Dead Sea, which separated it from the kingdom of Moab (for both Simeon and Judah lay considerably more south than the tribe of Reuben), and adjoined the mountainous country of Idumæa, or Edom, and Arabia Petræa, to the south. The next remarkable division, next to the distribution, by lot, among the twelve tribes, was made by king Solomon, who divided his kingdom into 12 provinces, or districts, each under a peculiar officer; but the most fatal division of all was that which obtained under his imprudent son Rehoboam, when ten of the twelve tribes revolted, under the conduct of Jeroboam, who became head of this new monarchy, styled the kingdom of Israel, in opposition to that of Judah, the title which distinguished the mained kingdom of Rehoboam, from that time downwards. Under the second temple the distinction lasted a considerable time, and the same sanguinary hatred and hostilities continued between these two kingdoms; that of Israel taking the name of Samaria, from its capital. See SAMARIA.

After the return from the Babylonian captivity, the eastern division of the land of Canaan was called Peræa (more properly the country which had belonged to Reuben and Gad, for the northern part, sometimes called Gaulonitis, was included in the district of Trachonitis), and the western part was divided into Galilee to the north, Judæa to the south, and Samaria in the middle. See each of these articles. Judæa Proper extended from the Dead Sea and the Mediterranean to Egypt, and included the countries of Benjamin, Dan, and Simeon, beside that of Judah. Under the Romans the land began to be divided into tetrarchies and toparchies: the larger were those of Judæa, Samaria, and Galilee, upper and lower; the lesser, those of Geraritica, Saron,

Saron, and others of less note; all which lay on this side of the Jordan. The rest, on the other side, were those of Gilead, Peræa, Gaulonitis, Auranitis, Batanea, and Decapolis. Josephus (*Antiq.* l. xiv. c. 10.) mentions another division, made in the time of Gabinius, into five districts, or, as he styles them, *συμβουλια*, or councils, agreeably to the Roman manner; these were Jerusalem, Jericho, and Sepphoris, on this side of Jordan; and Gadara and Amathus on the other. The whole country was also called PALESTINE (which see), from the Palestinians or Philistines, who inhabited the western coasts, and were first known to the Romans; but it was more commonly called JUDÆA (which see), or Judæa Palestina, from Judah, whose tribe was the most considerable of the twelve, and possessed the finest and most fertile part of the whole. Christians, as well as Jews, have dignified it with the title of "Holy Land;" partly on account of its metropolis, supposed to have been the centre of God's worship, and his peculiar habitation; but chiefly for its being the native country of Jesus Christ, and the scene on which he accomplished the great work of our redemption. It has also been distinguished by other appellations; such as the "Land of Promise," the "Land of God," the "Land of Israel," and sometimes, by way of pre-eminence, "the Land." In modern writers, all distinction is frequently lost in the general name of Syria, which is given to the whole country east of the Mediterranean, between the sea and the desert. As many of the old inhabitants of the north-west of the land of Canaan, particularly on the coasts of Tyre and Sidon, were not driven out by the children of Israel, this tract seems to have retained the name of Canaan a long while after those other parts of the country, which were better inhabited by the Israelites, had lost the said name. The Greeks called this tract, inhabited by the old Canaanites, along the Mediterranean sea, PHœNICIA (which see); the more inland parts, as being inhabited partly by Canaanites, and partly by Syrians, Syro-Phœnicia; and hence the woman said by St. Matthew (*ch.* xv. 22.) to be a woman of Canaan, whose daughter Jesus cured, is said by St. Mark (*ch.* vii. 26.) to be a Syro-Phœnician by nation, as she was a Greek by nation and language. The principal mountains of the land of Canaan or Palestine are Libanus or Lebanon, Anti-Libanus, Hermon, Tabor, Carmel, Olivet, Calvary, Moriah, and Gihon, which see respectively. The most noted vallies were the valley of Blessing, or Berakhah, in the tribe of Judah, on the west side of the lake of Sodom, and in the wilderness of Tekoah; the vale of Siddim, famed for the overthrow of Chedorlaomer and his confederate kings (*Gen.* xiv. 2, &c.), and for the cities of Sodom and Gomorrah, now forming the Asphaltite lake; the valley of Shaveh, or royal valley, where the king of Sodom met victorious Abraham, after the defeat of the confederate kings; the vale of Salt, in which the Edomites were subdued by David and Amaziah (*2 Sam.* viii. 13. *2 Kings*, xiv. 7.); the valley of Jezreel, famed for the death of Jezebel, the idolatrous wife of Ahab; the valley of Mamre, famous for the oak under which Abraham dwelt, about 15 miles from Hebron, and 25 from Jerusalem; the vale of Rephaim, or of the Titans and Giants, near the city of Jerusalem; the vale of Jehoshaphat, in or near Jerusalem; the valley of Hinnom, near the walls of Jerusalem, notorious for the superstitious and bloody rites performed there in ancient times; the valley of Zeboim, near the Dead Sea; the valley of Achor, near Jericho; the valley of Bochim, or of the mourners (*Judg.* ii. 1, &c.), at a small distance from Jerusalem; and the valley of Elah, famous for the defeat and death of Goliath by David, and for the victory which the Israelites obtained against the

Philistines (*1 Sam.* xvii. 2, &c.). The country had also several noted plains, the most remarkable of which is that through the midst of which lay the course of the river Jordan, computed to be about 150 miles in length, from the city of Seythopolis northward to the Asphaltite lake. In this country were also several forests, such as those of Hareth, of Ephraim, of Lebanon, in which Solomon had a sumptuous palace, and of Bethel. The seas of Canaan are commonly reckoned five; viz. the Mediterranean, called by the sacred writers the Great Sea; the Dead Sea or lake of Sodom; the Sea of Tiberias; the Samachonite Sea or lake; and the Sea of Jazer. The most considerable river is JORDAN, which see. For a further account of this country and its inhabitants, see CANAANITES and PALESTINE.

CANAAN, in *Geography*, a thriving township of America, in Lincoln county, and district of Maine, seated on Keanebeck river, about seven miles north of Hancock, incorporated in 1788, and containing 454 inhabitants.—Also, a township of Grafton county, in New Hampshire, 10 miles E. of Dartmouth college; incorporated in 1761, and containing, in 1790, 483 inhabitants.—Also, a township of Litchfield county, in Connecticut, E. of Housatonic river, with Massachusetts on the north. It has a forge and flitting mill, and furnishes excellent iron. The mountains afford valuable minerals, particularly lead and iron. It is distant 60 miles from New Haven, and 40 N.W. from Hartford.—Also, a township of Essex county, in Vermont, being the north-easternmost town in the state.—Also, a township of Columbia county, in New York, between Kinderhook on the west, and Massachusetts on the east. It has 6692 inhabitants, including 35 slaves.

CANAANITES, in *Scripture History*, the posterity of Canaan by his eleven sons, who are supposed to have settled in the land of Canaan, soon after the dispersion of Babel. Five of these are known to have dwelt in the land of Canaan; viz. Heth, Jebus, Hemor, or Amor, Girgash, and Hevi or Hivi; and these, together with their father Canaan, became the heads of so many nations. Sina or Sini was another son of Canaan, whose settlement is not so precisely ascertained; but some authors infer, from the affinity of the names, that the desert of Sin, and mount Sinai, were the place of his abode, and that they were so called from him. The Hittites inhabited the country about Hebron, as far as Beer-sheba, and the brook Besor, reckoned by Moses the southern limits of Canaan. The Jebusites dwelt near them on the north, as far as the city of Jebus, since called Jerusalem. The Amorites possessed the country on the east side of Jordan, between the river Arnon on the south-east, and mount Gilead on the north, afterwards the lot of Reuben and Gad. The Girgashites lay next above the Amorites, on the east side of the sea of Tiberias, and their land was afterwards possessed by the half tribe of Manasseh. The Hivites dwelt northward, under mount Libanus. The Perizzites, who make one of the seven nations of the Canaanites, are supposed, by Heylin and others, to be the descendants of Sina or Sini; and it is probable, since we do not read of their abode in cities, that they lived dispersed, and in tents, like the Scythians, roving on both sides of the Jordan, on the hills and plains; and that they were called by that name from the Hebrew, *pharatz*, which signifies to *disperse*. The Canaanites dwelt in the midst of all, and were surrounded by the rest. This appears from the sacred writings to have been the respective situation of those seven nations, which are said to have been doomed to destruction for their idolatry and wickedness, when the Israelites first invaded their country. The learned have not absolutely determined whether the nations proceeding from

CANAANITES.

Canaan's other six sons should be reckoned among the inhabitants of the land of Canaan. The prevalent opinion is, that they were not included. As to the customs, manners, arts, sciences, and language of the seven nations, that inhabited the land of Canaan, they must, from the situation they severally occupied, have been very different. Those who inhabited the sea-coast were merchants, and by reason of their commerce and wealth scattered colonies over almost all the islands and maritime provinces of the Mediterranean. See PHENICIA. The colonies which Cadmus carried to Thebes in Bœotia, and his brother Cilix into Cilicia, are said to have proceeded from the stock of Canaan. Sicily, Sardinia, Malta, Cyprus, Corfu, Majorca, Minorca, Gades, and Ebutris, are supposed to have been peopled by the Canaanites. (See BOCHART'S CANAAN.) The other Canaanites, whose situation was inland, were employed partly in pasturage, and partly in tillage, and they were also well skilled in the exercise of arms. Those who dwelt in the walled cities, and who had fixed abodes, cultivated the land; and those who wandered about, as the Perizzites seem to have done, grazed cattle, or carried arms: so that among the Canaanites, we discover the various classes of merchants, and, consequently, mariners; of artificers, soldiers, shepherds, and husbandmen. We learn, also, from their history, that they were all ready, however diversified by their occupations or local interests, to join in the common cause: that they were well appointed for war, both offensive and defensive; that their towns were well fortified; that they were sufficiently furnished with military weapons and warlike chariots; that they were daring, obstinate, and almost invincible; and that they were not destitute of craft and policy. Their language, we find, was well understood by Abraham, who was an Hebrew, for he conversed readily with them on all occasions; but as to their mode of writing, whether it was originally their own, or borrowed from the Israelites, it is not so easy to determine. Their religion seems to have been preserved pure till the days of Abraham, who acknowledged Melchisedek to be priest of the most high God; and Melchisedek was, without doubt, a Canaanite, or, at least, dwelt at that time in Canaan, in high esteem and veneration.

But we learn from the scripture history, that the Hittites in particular were become degenerate in the time of Isaac and Rebekah; for they could not endure the thoughts of Jacob's marrying one of the daughters of Heth, as Esau had done. About this time, then, we may date the origin of those abominations which subjected them to the divine displeasure, and made them unworthy of the land which they possessed. In the days of Moses, they were become incorrigible idolaters; for he commands the Israelites "to destroy their altars, and break down their images (statues or pillars), and cut down their groves, and burn their graven images with fire." And lest they should pervert the Israelites, the latter were strictly enjoined not to intermarry with them; but "to smite them, and utterly destroy them, nor shew mercy upon them." Deut. vii. 1-5. They are accused of the cruel custom of sacrificing men, and are said to have passed their seed through fire to Moloch. Levit. xviii. 21. Their morals were as corrupt as their doctrine; adultery, bestiality of all sorts, profanation, incest, and all manner of uncleanness, are the sins laid to their charge. The Canaanites, says Mr. Bryant, (Anal. Anc. Mythol. vol. i. p. 371.) as they were a sister tribe of the Mizraim, resembled them in their rites and religion. They held a heifer, or cow, in high veneration, agreeably to the customs of Egypt. Their chief deity was the sun, whom they worshipped, together with the Baalim, under the titles of

Oorchol, Adonis, or Thamuz. The Canaanites, at Byblos, Berytus, Sidon, and afterwards at Tyre, used, in imitation of the Egyptians, mournful dirges for the loss of Adonis or Thamuz, who was the same as Thamas and Osiris in Egypt: and their measures and harmony seem to have been very affecting, and to have made a wonderful impression on the minds of their audience. This infectious mode of worship prevailed to such a degree, that the children of Israel were forbidden to weep, and make lamentation upon a festival. See Nehem. viii. 9. 11. Joseph. Antiq. l. xi. c. 5. p. 563. Among the Canaanites, this manifestation of sorrow was encouraged, and made part of their rites.

As to the government of the Canaanites, they seem to have been comprehended in a great number of states, under subjection to limited chiefs, or kings, as they are called; and transacted all their business in popular assemblies.

When the measure of the idolatries and abominations of the Canaanites was completed, God delivered their country into the hands of the Israelites, who conquered it under Joshua. However, they resisted with obstinate valour, and kept Joshua employed six years, from the time of his passing the river Jordan, and entering Canaan, in the year B. C. 1451, to the year B. C. 1445, the sabbatical year beginning from the autumnal equinox; when he made a division of the land among the tribes of Israel, and rested from his conquests. As God had commanded this people, long before, to be treated with rigour (See Deut. vii. 2.), Joshua extirpated great numbers, and obliged the rest to fly, some into Africa, and others into Greece. Procopius says, they first retreated into Egypt, but advanced into Africa, where they built many cities, and spread themselves over those vast regions, which reach to the straits, preserving their old language, with little alteration. In the time of Athanasius, the Africans still said they were descended from the Canaanites; and when asked their origin, they answered, "Canaan." It is agreed, that the Punic tongue was nearly the same as the Canaanitish or Hebrew.

After the Canaanites had been successively defeated, and, at length, dispersed and reduced, the Anakims, a fierce and barbarous race, who inhabited some of the mountains of the land, of a distinct origin from the Canaanites, were invaded and cut off; and thus, by degrees, the Israelites became masters of the greatest part of the land of Canaan. However, the Canaanites of several denominations were strong and powerful, and retained no mean share of the country; and, for 19 or 20 years, the remainder of Joshua's days, they were very little molested. At length, when the division was completely settled, the Canaanites were, on all sides, invaded again by the tribes of Israel, who wished to drive them out of their respective lots. However, in the conflicts thus occasioned, the contending parties seem to have been pretty equally matched; so that although multitudes of the Canaanites were slain in the wars with Joshua, and many of them fled in quest of more quiet habitations, yet, after all their calamities, they appear to have been little inferior to the Israelites; nor do we find that any one tribe of them was missing, except the Girgashites, who, it is said, fled into Africa, and settled in that country. Thus it appears, that some of the more immediately devoted nations, viz. the Canaanites, Hittites, Amorites, Hivites, and Jebusites, were allowed to dwell in common with the children of Israel in their promised land. See Judges, ch. i. ii. For this exercise of mercy and toleration reasons of a political and religious nature have been assigned. Thus the Israelites were prevented from sinking into a sluggish and inactive state, as they had enemies to excite and exercise their courage, and

to keep up among them martial discipline; they were thus preserved in a condition of immediate dependance on God, and directed to look constantly to him for succour; and it was thus provided, that no part of the country, which was too extensive to be every where inhabited by the Israelites at their first settlement, should be left desolate, so as to become a refuge for wild beasts, which, by their increase, might prove a more dreadful and pernicious enemy than the Canaanites. Besides, it has been very justly alleged, that though the order for extermination was positive and absolute, the promise of power to fulfil it was limited and conditional. It was not till after the Israelites had forsaken the Lord, and worshipped other gods, that the Lord would no more enable them to expel the Canaanites. The Canaanites seem to have been able to have maintained their ground in several parts of the country, and particularly in Jerusalem, till the reign of David; when that city, which had been held by the Jebusites, was taken by storm. They were also invaded in Gezer by Pharaoh; their city was burnt, and they were all put to the sword. Thus oppressed by the Israelites on one hand, and by the mighty power of Egypt on the other, the remaining Amorites, Hittites, Perizzites, Hivites, and Jebusites, were reduced, in the reign of Solomon, to a state of slavery, and employed in the labour of carrying on his vast and sumptuous works; and this severity was entailed on their posterity. 1 Kings, ix. 20, 21. Ezra, ii. 55, 58. Nehem. xi. 3. Although upon their first reduction, they became proselytes to the Jewish religion, yet it has been thought, that they were distinguished from the Jews, and reckoned of a more ignoble blood, born to drudgery. Among the tribes of the Canaanites above enumerated, who became subject to the yoke of Solomon, the Canaanites, peculiarly so called, are omitted. These, we may therefore conclude, bore no part of the burden imposed upon the others; but remained free and independent in their possessions on the sea-coast, rose afterwards to great celebrity, and, continually improving themselves in navigation, commerce, and the useful arts, were comprised under the appellation of Phœnicians. *Anc. Un. Hist.* vol. i.

The destruction of the Canaanites, and the expulsion of them from their country by a divine order, whilst some of them were allowed to remain in opposition to this order, have afforded a theme, on which septs and infidels have vehemently declaimed; and which they have urged as an unanswerable objection either to the truth of the scripture history, or, admitting the fact, to the moral providence of God. This objection has been lately stated in its full force by a learned commentator and critic (Dr. Geddes) in the preface to the 2d volume of his "Translation," and also in the 1st volume of his "Critical Remarks," p. 422, &c.; and instead of obviating it by argument, or admitting the sufficiency of the solution of the difficulty, proposed by other ingenious and learned writers, he boldly ruts the Gordian knot, respecting the order supposed to be given by God for the extermination of the Canaanites; deeming this method preferable to the unsuccessful endeavours of other scriptural writers to untie it. Instead of acceding to any of the arguments which have been employed in defence, or even in extenuation, of this supposed cruel and sanguinary measure, he denies that any such order proceeded from God, or even from the mouth of Moses. He suspects it to be "the fabrication of some posterior Jew, to justify the cruelties of his nation." Of course, he disputes the absolute and universal inspiration of the Hebrew writers. It is beside our purpose to enter at large into the discussion of this subject.

But when we consider, that the extermination of the Canaanites forms a leading and prominent part of the scripture history, and that it is, more directly or indirectly, referred to as the consequence of a divine order, in a great variety of passages, the idea of the fabrication of such an order by a posterior Jew, seems to us to be altogether inadmissible. The account of this event, and of the circumstances succeeding and attending it, pervades the whole Jewish history; and if we suppose that the providence of God had no concern in the conduct and execution of it, we must be led to admit a great number of fabrications and interpolations in the detailed account which the scripture has given us of it, and we shall ultimately undermine the truth of the history itself, and find it difficult to determine what part of it is authentic and true and what is forged and false. But we are of opinion, that the objection itself, which has been repeated by Tindal, Morgan, and Bolingbroke, and last of all by the author of the "Age of Reason," has been as often satisfactorily refuted. To this purpose it has been argued, that the Canaanites were guilty not only of the grossest idolatries, but of the most execrable vices, some of which have been thought to deserve death, and have been so punished in all civilized countries. God expressly declares, after warning the Israelites against these abominable crimes, that because of these things "he abhorred those nations and cast them out." Lev. xx. 23. It is plain then, that the wickedness of the Canaanites was the true cause of the punishment that was inflicted upon them; and accordingly it is given as a reason why they were not long before expelled and destroyed, that the "iniquities of the Amorites was not yet full." Gen. xv. 16. It was not, therefore, till the measure of their sins was compleated, and their wickedness became universal and incorrigible, that the threatened judgment was inflicted. Now can it be denied, that God, who is the sovereign arbiter of life, and who may, and actually does, whenever he pleases, take away men's lives without injustice, may in just judgment cut short the lives of persons for their crimes, and bring general destruction even upon communities of people or nations? Why, it may be asked, should the destruction of a small part of the inhabitants of the earth be pronounced to be incompatible with the divine attributes, while the destruction of the whole world by the deluge is passed by without any comment? The general destruction of the human race in the latter case, and the partial extermination of the Canaanites, are to be accounted for upon precisely the same principle. In both cases it was the enormous wickedness of the people which drew upon them such signal punishment. This kind of punishment of individual or national wickedness may serve the purpose of instructive example and warning to the world in general; and in the case before us it was highly expedient, and even necessary for the instruction of that age of mankind, that the Supreme Ruler should make a signal and striking example of a nation so far sunk in idolatry and corruptions of all kinds, as all the inhabitants of Canaan are said to have been. With respect to the mode of the punishment of the Canaanites, it may be observed, that if God had destroyed them by famine or by pestilence, if he had caused fire from heaven to consume them, or exterminated them by an inundation or an earthquake, none could have presumed to arraign the wisdom and justice of his proceedings; although in calamities of this public nature infants must have suffered as well as the parents; and among the adults some innocent individuals must have been involved in the common ruin. In such a case it could not have been said, that

that this was contrary to the law of nature, or that it was not conformable to the usual conduct of Providence. But then it would not have been so apparent, that this calamity of their extermination was inflicted by way of punishment for their idolatry and detestable wickedness. It might possibly have been attributed to some natural cause, or have been regarded as an unaccountable and fortuitous event. But when they were ordered to be exterminated for their abominable crimes by an express command of God, attested by a series of the most amazing miracles and divine interpositions; and this was appointed to be executed by another nation, peculiarly set apart by their original constitution to the acknowledgment and worship of the one true God, and of him only, and to whom God had given the most excellent and holy laws, threatening them at the same time with similar punishments if they committed the like crimes:—in this case, the reason of the judgment was as apparent as when a malefactor is put to death by an officer of justice for a crime, in execution of the sentence of a just magistrate. Nor in such a procedure is there any thing, that can be proved to be inconsistent with the wisdom and righteousness of the Supreme Being, or contradictory to his own laws; since there is no law of nature that debars God from executing judgments on particular persons, or guilty nations, for their crimes and vices, even to extermination; or from employing, if he thinks fit, one or more nations to execute his judgments upon others. In this instance the word of God is in perfect harmony with his works and those manifestations of the divine attributes that are discernible in the book of nature.

Although God cannot dispense with the absolute and immutable obligations of doing whatever is just and right; yet a command from God may either make or imply some change in the circumstances and relations of things, on which the moral fitness of the human conduct depends, and consequently it may be fit and right to do that in virtue of a divine command, which it would not have been fit to do without it.

Lord Bolingbroke, indeed, (vol. iii. p. 305, vol. v. p. 148.) has compared the invasion of Canaan by the Israelites, and what they did there, to the cruelties exercised by the Spaniards in America, and to the ravages of the Huns under Attila, who, he says, were much more merciful than they; but he seems to forget the difference between these cases; viz. that the latter had no motive or pretence, but their own ambition, avarice, and cruelty; whereas the former acted in execution of the express command of God, and by a commission from him, the truth of which was confirmed by a series of the most extraordinary divine attestations that the world ever saw. This can, therefore, furnish no precedent for any other nation to do the like, except they can produce the same or equal proofs of a divine commission. The same general answer will suffice for obviating several of the inferences deduced from this event by Dr. Geddes, *ubi supra*. It would be a sufficient reason for the extermination of the Canaanites by the sword of the children of Israel, if, as is very possible, this was the best method of impressing the minds of the Israelites themselves with a just idea of the heinous nature of idolatry, and to make sufficient provision against their being seduced into the same abominable practices. If their living only in the neighbourhood of idolatrous nations was so unsafe for this people, as their history shews it to have been, what danger would they not have been in, if they had spared the old inhabitants of Canaan, and suffered them to live unmolested among them? It ought also to be considered, that in all the other wars in which the Israelites might happen to be engaged, with their

neighbouring nations, they were expressly enjoined to pursue different and more humane maxims, sparing all except such as were found bearing arms. In this particular case only they were expressly commanded to “exterminate utterly.” That the Israelites were not influenced by the usual passions of conquerors, but acted under an authority which controuled their natural desires, is manifest from their sparing even the cattle, and even refraining to appropriate to themselves the treasure which they found in Jericho, which was the first fruits of their conquests, and to be devoted to God. The Israelites have often been compared to barbarous conquerors and cruel murderers; but let other conquerors and assassins be produced, who refrained from plunder as they did. That they were not actuated by mere rage and revenge is evident from their having received no particular provocation, not indeed having had any personal intercourse with the inhabitants of Canaan. Their motives must, therefore, have been very different from those of common robbers and murderers; and in the judgment of reason, it is the motive that determines the nature of the action. It is also remarkable, that notwithstanding the passion which the Israelites may be supposed to have had for war, which would have been inflamed by the rapidity of their conquests, they were forbidden to extend them beyond the boundaries of the land of Canaan; and the constitution of their government was altogether unsuited to extensive empire.

The learned Mr. Bryant in his Treatise on the authenticity of the Scriptures, (p. 245, &c.) argues against the objection which we have been considering, that the Canaanites were usurpers, and had acted in direct defiance of an ordinance of God, by seizing upon the land appropriated from the beginning to the children of Israel. Moses, accordingly, intimates, that the land of Canaan was their peculiar inheritance, Deut. xxxii. 7, 8. In the Eusebian Chronicle of Scaliger it is mentioned, that Canaan the son of Ham, first made an innovation in the world. “He trespassed upon the rights of his brethren, and seized upon the land, which had been appropriated to God’s future people.” When the Israelites, therefore, were brought to Canaan, they came to their own inheritance, and those who usurped their property knew it, and knew by whom it had been appointed.

After all, we may observe, that the order to exterminate utterly in the case of the Canaanites, though expressed in *absolute* terms, is supposed by some to have been *conditional* in fact; and that their lives were to have been spared upon their submission, and especially upon their forsaking idolatry. Accordingly, it is plain in fact, that the Israelites either did not understand the command to be absolute, or they knowingly transgressed it, even in the best and most flourishing state of their affairs. To this purpose we have already remarked, that many of the Canaanites lived in subjection to the Israelites even to the times of their kings (1 Kings ix. 20, 21.); nor do we ever read that they were blamed for the favour they shewed them. Moreover, the reason and end for which the order for the extermination of the Canaanites was given, viz. lest the children of Israel should be enticed by them into idolatry, entirely ceased upon their submission, and abandoning their idol worship, which was generally the case. Besides, it is pretty clearly inferred, that this order was conditional, from the circumstance, that if the hearts of the Canaanites had not been hardened to oppose the Israelites, they would not have been cut off. Josh. xi. 19, 20. Accordingly it has been alleged, that the severity of the judgments inflicted upon the Canaanites for their extreme wickedness, of which the Israelites were the instruments, was not executed in the degree or

to the extent which has been supposed. This has been maintained with great strength of argument by learned and impartial judges; by Maimonides and others of the first account among the Jews, and also by many Christians of our own and other countries. Grotius, in particular, on Deut. xx. 10. maintains, that the law, Exod. xxiii. 31, 32. and Deut. vii. 1, 2, was to be extended only to such of these people as did not surrender themselves on being summoned; as is evident from Joshua xi. 19, 20. We shall further add, that idolatry, under the Jewish theocracy, was a crime of peculiar malignity: and therefore, although God has not thought fit to enact a general law obligatory on all mankind for punishing idolaters with death, and without his appointment it might not be executed; yet when it pleased him for wise ends to select a particular nation, and among them to erect a peculiar sacred polity, and to appoint that the worship of the one true God and of him only should be the very basis of their constitution, on which all their privileges, their national property, and their right to their country depended, it is evident, that under such a constitution to revolt to idolatry and polytheism was in the most criminal sense to be traitors to the community: and of course to arraign a law for inflicting a capital punishment upon idolaters under that particular constitution is highly absurd. Nor should it be forgotten, that the idolatry of the ancient Gentile world, and especially that of the inhabitants of Canaan, was by no means a system of merely speculative opinions; but a course of the most atrocious and abominable practices, enjoining the cruel murder of numberless innocent children, as well as other human victims, and the most shocking lewdness, together with other vices of the most detestable nature. And surely it becomes a wise legislator and the moral Sovereign of the universe to restrain, by the most authoritative and awful sanctions annexed to his laws, the commission of such destructive vices as these.

Mr. Wakefield, in his "Reply to the Second Part of the Age of Reason," by Thomas Paine, suggests, that some qualifications and softenings in the case of many relations and occurrences in the scripture history, may be properly admitted, without any danger to the main fabric of revelation, upon the ground of exaggeration from national vanity, and the pride of individuals. Hence, he says, we may presume upon enlargement in the part of the narrative on the splendour of their victories, the number of the slain, and the extent of their desolations. He further intimates, that the Jewish historians had been accustomed to speak of every transaction as prescribed by the express injunctions of Jehovah, when we are under no necessity, as he conceives, of supposing a specific and actual interference in the case, but may very rationally, and in conformity to the rules of accepted interpretation, have recourse for a solution to that predominant and universal persuasion, from their infancy, of the peculiar superintendence of Jehovah, not only over the political welfare of their state, but the private concerns of individuals. He adds, that it is a point worthy of investigation how far Joshua, and his fellow soldiers, in conformity to the ferocious character of the times, and the sanguinary propensities of military men, may actually have exceeded their commission, and indulged themselves in unauthorized acts of murder, rapine, and devastation. Having collected a variety of opinions on this interesting subject, we must refer for a further discussion of it to the authors already cited, and to the following publications: Leland's Answer to Christianity as old as the Creation, vol. ii. p. 429, &c. Leland's Deistical Writers, vol. ii. p. 446, &c. Priestley's Institutes, vol. ii. p. 22, and Priestley's Notes on all the Books of Scripture, vol. i. Preface, Sermons, &c. by Jo-

seph Nicol Scot. vol. i. Lindsey's Conversations on the Divine Government, p. 80—85. Bishop of Lincoln's Elements of Christian Theology, vol. i. p. 70, &c.

CANACA, in *Ancient Geography*, a town of Spain, placed by Ptolemy in the country of the Turdetani.

CANACE, in *Entomology*, an Indian species of PAPILIO, described by Linnæus, the wings of which are angulated and blue, with a pale band; beneath yellow, and green marbled. Amœn. Acad.

CANADA, sometimes called the *Province of Quebec*, in *Geography*, a country of North America belonging to Great Britain, bounded on the north by Hudson's bay, East Main and Labrador, on the east by Labrador, the bay of St. Lawrence, and New Brunswick, on the south by the United States, and on the west by Lake Winnipeg and parts of America hitherto imperfectly described. It is computed to extend from the gulf of St. Lawrence and Isle of Anticosti in the east, to the lake of Winnipeg in the west, or from 64° to 97° W. long. 33 degrees, or about 2000 geographical miles, the breadth from the lake of Erie in the south, or N. lat. 43°, may extend at least to N. lat. 49°, comprehending 6 degrees, or 360 geographical miles. Others make its extent much more considerable towards the north, and estimate it at 500 miles. Its mean breadth is not above 200. It is now divided into two provinces, called Upper and Lower Canada; the former, which has been commonly denominated the Upper country, lies north of the Great Lakes, and is separated from New York by the river St. Lawrence, here called the Cataraqui, and the lakes Ontario, and Erie. Its capital is Newark, or Niagara, on the British side of the Niagara; beside which it has Kingston, inhabited by emigrants from the United States, and reckoned by some the chief town. The latter lies on both sides of the river St. Lawrence, and has for its capital Quebec, the chief city of the whole country. Upper and Lower Canada are separated by the river Utawas, or more precisely by a line, which commences at a stone boundary on the north bank of lake St. Francis in the river St. Lawrence at the cove, W. of Point-au-Boudet, and runs thence northerly to Utawas river, and to its source in lake Tomisicaning, and thence due north till it strikes the boundary of Hudson bay, or New-Britain. Upper Canada includes all the territory to the westward and southward of the said line, to the utmost extent of the country known by the name of Canada. The original population of this country consisted of several savage tribes, and it is said to have been first discovered in 1497 by John and Sebastian Cabot. The French were the first Europeans who took possession of it, and made their settlement at Quebec in 1608. In the year 1759 Quebec was captured by General Wolfe; and Canada was ceded to Great-Britain by the treaty of Paris in 1763. From this period till the year 1774 the internal affairs of the province were regulated by the ordinance of the governor alone. In pursuance of the Quebec bill, which was then passed, a legislative council was appointed by his majesty, and the number of its members was limited to twenty-three. But by an act passed by the British parliament in 1791, the executive power in each province was vested in the governor; and a legislative council, and an assembly, were appointed for each of the provinces of Upper and Lower Canada, having power to make laws with the consent of the governor; but the king may declare his dissent at any time within two years after the bills are received, in which case they become void. The legislative council of Lower Canada consists of 15 members; that of Upper Canada of seven. They are summoned by the governor under the king's authority, and appointed for life, unless they forfeit their office by an absence of four

years, or by swearing allegiance to any foreign power. The assembly of Lower Canada consists of 50 members, and that of Upper Canada of 16; and they are chosen by the freeholders in the towns and districts. The assembly is not to continue longer than four years, but it may be dissolved sooner; and the governor is bound to convene it at least once in each year. The governor, together with such of the executive council, as shall be appointed by the king for the affairs of each province, are to be a court of civil jurisdiction for hearing and determining appeals; subject, however, to such appeals from their sentence as heretofore existed. All lands in Upper Canada are to be granted hereafter in free and common socage; and also in Lower Canada, when the grantee shall desire it, subject, nevertheless, to alterations by an act of the legislature; and the present system of judicature in each province was established by the Quebec bill of 1774. But whilst the French laws were suffered by the Quebec bill to exist, in order to conciliate the affections of the French inhabitants, who were attached to them, although the abolition of these laws would be favourable to the interests of civil liberty; the criminal law of England was happily established through every part of the country. The whole of British America, Canada included, is superintended by an officer styled governor-general of the four British provinces in North America, who, besides other powers which he possesses, is commander in chief of all the British troops in the four provinces, and the governments attached to them, and Newfoundland. Each of the provinces has a lieutenant-governor, who, in the absence of the governor-general, is invested with all the powers requisite to a chief magistrate.

By an act passed in the 18th year of his present majesty's reign, the British parliament has the power of making any regulations, that may be found expedient, respecting the commerce and navigation of the province, and also of imposing import and export duties, restricted to the use of the province, and applied in such a manner as the laws made in the council and assembly direct.

Every form of religion is completely tolerated in both provinces; but the Roman catholic religion is that of a great majority of the inhabitants; and by the Quebec bill of 1774, ecclesiastics of that persuasion are legally empowered to recover all the dues, which, before that period, they were accustomed to receive, as well as tithes, from the Roman catholic inhabitants; nevertheless, they cannot exact any dues or tithes from Protestants, or from lands held by Protestants; although such lands might formerly have been subjected to dues and tithes for the support of the Roman catholic church. These dues and tithes are, however, still to be paid to persons appointed by the governor and reserved in the hands of his majesty's receiver-general, for the support of the Protestant clergy actually residing in the province. By the act of the year 1791 it was also ordained, that the governor should allot out of all lands belonging to the crown, granted after that period, one-seventh for the benefit of the Protestant clergy, to be solely applicable to their use; and it is required that all such allotments should be particularly specified in every grant of waste-lands; otherwise the grant is void. The governor, with the advice of the executive council, is authorised to constitute parsonages or rectories, and to endow them out of these appropriations, and to present incumbents to them, ordained according to the rites of the church of England. The clergy of this church, in both provinces, consist at present only of 12 persons, including the bishop of Quebec; whereas those of the church of Rome amount to 120, viz. a bishop, three vicars-general, and 116 curates and missionaries, all of whom are resident in the lower pro-

vince, except five curates and missionaries. The number of the dissenting clergy, in both provinces, is considerably smaller than that of the clergy of the church of England. The population of Upper Canada has been stated by some to amount to 40,000, by others to 20,000 British and French inhabitants, exclusive of 10,000 loyalists, who are settled in the upper parts of the province. Lower Canada, according to a census, ordered to be taken by general Haldimand in 1784, contained 113,012 inhabitants. Both provinces may probably now contain more than 150,000 persons; and their number is multiplying both by a natural increase and by emigrants from other countries. The number of savages has been estimated at 50,000. About nine-tenths of the inhabitants of these provinces are Roman catholics; and about five-sixths of those of Lower Canada are supposed to be of French extraction. Some of the lower classes of the French Canadians possess all the gaiety and vivacity of the people of France; but others have, to appearance, a great deal of that fullness and bluntness in their manners which is characteristic of the people of the United States: vanity, however, is the predominant feature in the character of all of them. Few of the men can read or write, and in this respect are much inferior to the women; but both men and women are sunk in ignorance and superstition, and blindly devoted to their priests. The French language is universally used; English being restricted to the few British settlers. The houses in Lower Canada are in general well furnished with beds, in the French style, very large, and raised four or five feet high. The houses are for the most part built of logs; but they are much more compact and better constructed than those of the United States; the logs being fitted more closely together, planed and white-washed externally, and generally lined with deal boards within. However, the inattention of the inhabitants to the admission of air, by occasionally opening their windows, renders them very disagreeable and even unwholesome. The expences of the civil list in this province are estimated at 20,000*l. per annum*, one-half of which is defrayed by Great Britain, and the other moiety by the province, out of the duties paid on the importation of certain articles, such as spirits, wine, sugar, molasses, coffee, tobacco, salt, and playing cards. The expence of the civil list in Upper Canada is estimated at about a fourth of that of the lower province. The military establishment in both provinces, together with the repairs of fortifications, &c. is computed to cost Great Britain 100,000*l. annually*; and the like sum is chargeable for presents to the Indians, and salaries to officers employed among them in trade, &c. in Upper Canada. These expences, however, are thought to be counterbalanced by the advantages of the commerce with this country, which is said to employ about 7000 tons of shipping annually. The imports into Canada consist of earthen-ware, hard-ware, and household furniture, various articles of woollen, linen, and cotton, haberdashery, hosiery, &c. stationery, leather, and its manufactures, grocery, wines, spirits, West Indian produce, &c. &c. cordage of every description, and the coarse manufactures of iron. Some domestic manufactures of linen and of coarse woollen cloths are carried on in most parts of Canada; but the greater part of these articles is supplied by Great Britain. The exports from Canada consist of wheat, flour, biscuit, timber, staves, and lumber of various kinds, dried fish, oil, ginseng, and various medicinal drugs, but principally of furs and peltries. The eastern part of Lower Canada, between Quebec and the gulf of St. Lawrence, is mountainous; and a few scattered mountains also occur between Quebec and the mouth of the river Utawas; but higher up the river St. Lawrence the face of the country is flat. The soil consists principally of a loose dark-coloured earth.

C A N A D A.

earth, 10 or 12 inches deep, lying on a bed of cold clay. This thin mould, however, is very fertile, and yields plentiful crops, although it is worked every year by the French Canadians, without being ever manured. The manure chiefly used, since the practice of manuring has been introduced, by those who are the best farmers, is marle, which is found in great quantities in many places along the shores of the river St. Lawrence. The soil of Lower Canada is peculiarly adapted to the growth of small grain. Tobacco also thrives well in it, but the culture is neglected, except for private use; and more than half of what is used is imported. The snuff produced from the Canadian tobacco is held in great estimation. Culinary vegetables arrive at great perfection in Canada, which is also the case with most of the European fruits. The currants, gooseberries, and raspberries are very fine: the latter are indigenous, and are found very abundantly in the woods. A kind of vine is also indigenous; but the grapes produced by it in its uncultivated state are very poor and sour, and not much larger than fine currants. In the forest there is a great variety of trees; such as beech, oak, elm, ash, pine, sycamore, chestnut, and walnut; and the sugar maple-tree is found in almost every part of the country. Of this tree there are two kinds; the one called the swamp maple, being generally found on low lands, and the other, the mountain or curled maple, from its growing upon high dry ground, and from the grain of its wood being beautifully variegated with little stripes and curls. The former yields more sap than the latter, but its sap affords less sugar. A pound of sugar is frequently procured from two or three gallons of the sap of the curled maple, whereas no more than the same quantity can be had from six or seven gallons of that of the swamp tree. The maple sugar is the only sort of raw sugar used in the country parts of Canada, and it is also very generally used in the towns. See SUGAR.

The air of Lower Canada is very pure, and the climate uncommonly salubrious, except in the western parts of the province, high up the river St. Lawrence. From Montreal downwards the climate very much resembles that of the states of New England. This difference of salubrity in the two parts of the province is ascribed by Mr. Weld to the different aspects of the country; to the east, Lower Canada, like New England, is mountainous, but to the west it is an extended flat. According to his account, the extremes of heat and cold are amazing; Fahrenheit's thermometer, in the months of July and August, rising to 96°, and yet in winter the mercury generally freezes. The transitions from heat to cold are less sudden, and of course less injurious to the constitution in Canada than in the United States; and the seasons are much more regular. The snow begins to fall in November; which is the most unpleasant, cold, and gloomy part of the year: but in December the clouds are generally dissolved, the frost sets in, and the sky assumes a bright hue, continuing for weeks without a single cloud. The greatest degree of cold occurs in January, and it is sometimes so intense, as to endanger a person, who is exposed to it, being frost-bitten; but the coldest days have intervals of warm weather. The winter in Canada is the season of general amusement; and the Canadians transport themselves over the snow by means of their carioles and sledges, each of which holds two persons and a driver, and is usually drawn by one horse, with astonishing speed as well as great pleasure. With the same horse, says Mr. Weld, it is possible to travel 80 miles in a day. The Canadians contrive to guard against the cold by several stoves placed in their halls, from which flues pass to their different apartments, and by double windows and double doors to their houses. When they go abroad, they cover the whole body with furs, except the

eyes and nose. In May the thaw comes on very suddenly, and in its progress, the ice in the river St. Lawrence bursts with the noise of a cannon, and passes towards the sea with a tremendous rapidity and violence. As soon as the winter terminates, the rapid progress of vegetation is astonishing. Spring has scarcely appeared before it is succeeded by summer. In a few days the fields are clothed with the richest verdure, and the trees regain their foliage. The grain sown in grain time in May affords a rich harvest by the latter end of July. At this season of the year, however, Fahrenheit's thermometer seldom rises above 84°; in July and August it sometimes rises to 96°. The fall of the year is a most agreeable season in Canada, as well as the summer. It is observed, that there is in general a difference of about three weeks in the length of the winter at Montreal and at Quebec; and of course in the other seasons. When green peas, strawberries, &c. were entirely gone at Montreal, they were in full season at Quebec.

Mr. Weld, to whom we are indebted for a great part of this article, (see his *Travels*, vol. i.) has pointed out some inconveniences attending the tenures of land in Canada, which ought to be removed; more especially as in such a climate there is no occasion for a barrier against colonization. The botany of Canada differs little from that of the United States; and the chief singularities in the zoology are the moose, the beaver, and some other animals described by Mr. Pennant in his *arctic zoology*. The reindeer appears in the northern parts, and the puma and lynx are not unknown. Both the Canadas are much infested with rattlesnakes. The humming bird is not uncommon at Quebec. The mineralogy is of little importance; and though iron ores have been discovered in various parts of the country, works for the smelting and manufacturing of it have been erected only at one place, in the neighbourhood of Trois Rivières. The works are now the property of the British government. The bank of ore that supplies them is nearly exhausted. We learn from Kalm (vol. ii. 349.) that there are lead mines which yield some silver; and it is probable that copper may be found, as it appears in the south-west of Lake Superior. Coal has not yet been discovered in Canada. The country still remains to be examined, and it is highly probable that important discoveries might be made. Its chief natural curiosities seem to be its rivers, lakes, and cataracts.

One of the most remarkable accidents which history records of this country, provided that it were satisfactorily ascertained, is the earthquake of the year 1663, which is said to have overwhelmed a chain of mountains of free-stone more than 300 miles long, and changed the immense tract into a plain. We shall enumerate and describe the principal towns, lakes, rivers, and cataracts of this country in their proper places.

CANADA, *bay of*, lies on the east side of the island of Newfoundland, between White and Hare bays, which last lies north of it.

CANADA *creeks* are three creeks of North America: one a water of Wood creek, which it meets four or five miles N. N.W. of Fort Stanwix, or New Fort Schuyler. The other two are northern branches of Mohawk river; the upper of which mingles its waters with the Mohawk in the township of Herkemer, on the German flats, 16 miles below Old Fort Schuyler, and is crossed by an ingeniously constructed bridge; the other empties into the Mohawk 13 miles below. Both these creeks are long, rapid, and unnavigable streams, and supply the Mohawk with a considerable accession of water. The lands adjoining them are rich and valuable, and furnish inviting settlements.

CANADA, *sea of*, or sea of Huron, a name which might be given to the large inland sea, that is formed by the lakes Supe-

Superior, Michigan, and Huron, and which is about 350 miles in length, and more than 100 at its greatest breadth. See each of these articles.

CANADA-SAGA lake. See *SENEKA Lake*.

CANADENSIS, in *Ornithology*, a species of TETRAO, that inhabits Hudson's bay. The tail feathers are black, and at the tip tawny, and near the eyes are two white stripes. Gmel. This is supposed by late authors to be the male bird of the Linnæan TETRAO CANACE, which is described as having the tail entire, with a white spot behind the ears and nostrils. Syft. Nat. edit. 12.

CANADENSIS, a species of ARDEA, or Heron of the bald kind, distinguished by the name of the brown crane of Canada among English authors. The forehead is naked and papillous; body cinereous; wings testaceous on the outside. Gmel. Obf. This is the brown and ash-coloured crane of Edwards, *La Grue brune* of Buffon, and *La Grue de la Baye d'Hudson* of Brisson.

The length of this bird is three feet three inches. Bill three inches and three quarters long, of a dusky colour, with the tip of the upper mandible pale flesh colour. The top of the head is covered with a red skin thinly beset with hairs; cheeks and throat whitish; head and neck cinereous; upper part of the back, scapulars, and wing-coverts pale rufous margined with brown; breast, belly, thighs, and sides ash-coloured; tail deep ash; legs and bare part of the thighs black. This bird is peculiar to America. It subsists on corn, and Indian maize occasionally. Among the natives of North America it is known by the title of Samak-uchek-chauk.

CANAJOHARY, in *Geography*, a post-town of North America in Montgomery county, New York, seated on the south side of Mohawk river, and comprehending a large district of fine country; 40 miles W. of Schenectady, and 56 miles from Albany. In the state census of 1796, 730 of the inhabitants appear to be electors. A creek of the same name enters the Mohawk in this town. This was the principal seat of the Mohawk Indians, and abounds with apple-trees of their planting, from which is made excellent cyder.

CANAKAMPALEAM, a town of Hindoostan, in the Myfore country; 12 miles E. of Sattienungulum.

CANAL, *Canalis*, in general, denotes a long, round, hollow instrument, through which a fluid matter may be conveyed.

In which sense, it amounts to the same with what we otherwise call a pipe, tube, channel, &c. Thus the canal of an aqueduct, is the part through which the water passes; which, in the ancient edifices of this kind, is lined with a coat of mastic of a peculiar composition.

CANAL, a duct or pipe (as its derivation from the Latin *Cana*, a cane, or reed, seems to imply), in which sense it is used by anatomists in describing the passage through which some of the animal fluids pass: the term Canal has also been applied to denote any piece of water, especially if of a considerable length in proportion to its width, and especially such as are stagnant, or have not the fall and natural motion which rivers have. Canals may be either for pleasure or ornament, such as are common in the vicinity of palaces and great houses; or applied to the purposes of inland navigation. The artificial carriages for conveying streams of water for the supply of cities or other purposes, as was done by the famous aqueducts of antiquity, and in modern times by the new rivers near London, and others, have sometimes also been called Canals.

The importance and utility of canals have been so long and so generally acknowledged, that it is hardly necessary

to introduce the subject with any observations to this purpose. Few persons have more attentively considered or better understood the political and commercial interests of nations than the late Dr. Smith; and no one could be a more zealous advocate for the extension of inland navigation, as an effectual means of improving the country, in which it is encouraged. To this purpose he observes, in his "Wealth of Nations" (vol. i. p. 229.), that good roads, canals, and navigable rivers, by diminishing the expence of carriage, put the remote parts of the country more nearly upon a level with those in the neighbourhood of large towns; and on that account they are the greatest of all improvements. They encourage the cultivation of the remote parts, which must always be the most extensive circle of the country. They are advantageous to towns, by breaking down the monopoly of the country in its neighbourhood; and they are advantageous to all parts of the country; for though they introduce some rival commodities into the old markets, they open many new markets to its produce. "It is not more than 50 years ago," says he in 1776, when the first edition of his work was printed, "that some of the countries in the neighbourhood of London, petitioned the parliament against the extension of the turnpike roads into the remoter counties. Those remoter counties, they pretended, from the cheapness of labour, would be able to sell their grass and corn cheaper in the London market than themselves, and would thereby reduce their rents, and ruin their cultivation. Their rents, however, have risen, and their cultivation has been improved since that time." "All canals," says an intelligent writer on this subject (See Phillips's General History of Inland Navigation, Introd.), "may be considered as so many roads of a certain kind, on which one horse will draw as much as 30 horses on ordinary turnpike roads, or on which one man alone will transport as many goods as three men; and 18 horses usually do on common roads. The public would be great gainers were they to lay out upon the making of every mile of a canal twenty times as much as they expend upon a mile of turnpike road; but a mile of canal is often made at a less expence than the mile of turnpike: consequently there is a great inducement to multiply the number of canals."

The advantages resulting from canals, as they open an easy and cheap communication between distant parts of a country, will be ultimately experienced by persons of various descriptions: and more especially by the manufacturer, the occupier or owner of land, and the merchant. The manufacturer will thus be enabled to collect his materials, his fuel, and the means of subsistence, from remote districts, with less labour and expence; and to convey his goods to a profitable market. As canals multiply, old manufactures revive and flourish, new ones are established, and the adjoining country is rendered populous and productive. To the occupier of land, canals are useful in a variety of ways. In some cases, they serve the purposes of draining and of irrigation; in others, they furnish manure at a cheap rate; and they facilitate the conveyance of the produce to places where it may be disposed of to the greatest advantage. The landowner must of course be benefited, by the increasing value and advanced rent of his estate, in consequence of the improvement it receives from the industry of the occupier, excited and encouraged by an immediate recompence. The wholesale trader and merchant are likewise enabled to extend their commerce by means of canals; as they can thus export greater quantities and varieties of goods from places remote from the sea, and easily supply a wider extent of inland coun-

country with the commodities that are imported from foreign nations. Nor are they merely the means of extending and increasing foreign commerce, but they serve also to create and augment an internal trade, which, with all the advantages attendant on foreign commerce, may probably far exceed it in extent, value, and importance. We might add, that an inland communication between parts of a country, at a great distance from one another, contribute to the security, as well as to the extension of commerce, in the boisterous months of winter, and in times of war, when the navigation of the seas would be attended with danger. "Were we to make the supposition of two states," says Mr. Phillips (*ubi supra*), "the one having all its cities, towns, and villages upon navigable rivers and canals that have an easy communication with each other; the other possessing the common conveyance of land-carriage; and supposing, at the same time, both states to be equal as to soil, climate, and industry; commodities and manufactures, in the former state, might be exported 30 *per cent.* cheaper than in the latter; or, in other words, the first state would be a third richer and more affluent than the second." Should it be objected, that navigable canals waste or occupy too great a portion of land in the countries through which they pass, the objection may be obviated by the consideration, that one mile of a canal, 14 yards wide, takes up little more than five acres of land.

If we advert to fact, and consult the records of history with regard to the state of different nations, we shall find, that civilization and commerce have very much depended on the facility with which the inhabitants of remote districts have maintained intercourse with one another, as well as with distant countries. As the ocean serves to connect distant countries, navigable rivers and canals unite the different provinces and districts of the same country; and as navigation, by means of the ocean, produces an intercourse and mutual exchange of productions between different kingdoms, inland navigation, in like manner, facilitates a communication between different parts of the same kingdom, and consequently promotes trade and industry. In North America, the plantations have constantly followed either the sea-coast or the banks of the navigable rivers, and have scarcely any where extended themselves to any considerable distance from the one or the other. The nations that appear to have been first civilized, were those that dwelt round the coast of the Mediterranean sea, which, from a variety of circumstances, was extremely favourable to the early navigation of the world. Of all the countries on the coast of the Mediterranean, Egypt seems to have been the first, in which either agriculture or manufactures were cultivated and improved to any considerable degree. Upper Egypt extends itself nowhere above a few miles from the Nile, and in Lower Egypt that great river breaks itself into many different canals, which, aided by a small degree of art, seem to have afforded a communication by water-carriage, not only between all the large towns, but between all the considerable villages, and even to many farm-houses in the country; nearly in the same manner as the Rhine and the Maese do in Holland at present. The extent or facility of this inland navigation was probably one of the principal causes of the early improvement of Egypt. The improvement in agriculture and manufactures seems likewise to have been of very great antiquity in the provinces of Bengal in the East Indies, and in some of the eastern provinces of China. In Bengal, the Ganges and several other large rivers form a great number of navigable canals, in the same manner as the Nile does in Egypt. The case is the same in the eastern provinces

of China, where several large rivers form, by their different branches, a multitude of canals, and by communicating with one another afford an inland navigation much more extensive than that either of the Nile or the Ganges, or perhaps of both of them united. It is remarkable, however, that neither the ancient Egyptians, nor the Indians, nor the Chinese, encouraged foreign commerce; but they all seem to have derived their extraordinary opulence from this inland navigation. On the other hand, those nations that have been destitute of the means of inland navigation, either by rivers or canals, have remained from one age to the other in the same barbarous and uncivilized state. This observation is exemplified in the state of all the inland parts of Africa, and of that part of Asia which lies at any considerable distance north of the Euxine and Caspian sea, the ancient Scythia, and the modern Tartary and Siberia. The commerce that may be carried on by means of a river, which does not break itself into any great number of branches or canals, and which runs into another territory before it reaches the sea, can never be very considerable; because it is always in the power of the nation who possesses that other territory to obstruct the communication between the upper country and the sea. Thus the navigation of the Danube is of very little use to the different states of Bavaria, Austria, and Hungary, in comparison of what it would be if any of them possessed the whole of its course till it falls into the Black Sea. To these general observations, we shall subjoin a brief account of the principal canals that have been formed among the nations of antiquity, and among foreign nations in later times; reserving the principal part of this article for an enumeration of the canals of our own country, and for an illustration of the principles on which they are constructed, the regulations to which they are subject, and the various uses to which they are applied.

In the history of ancient nations we discover various traces of canals, formed for military, agricultural, commercial, or other purposes. The "fossiones Philistinæ" of Pliny (l. iii. c. 16.), which were large canals at the mouth of the Eridanus in Liguria, are ascribed by Mr. Bryant to the Canaanites, and particularly to the Caphtorim, who at a remote period migrated from Philistim; and hence these outlets of the river were named "Philistinæ." We learn from Herodotus (l. i. c. 174.) that the Cnidians, a people of Caria in Asia Minor, formed a design of digging a channel through the isthmus which joined their territory to the continent; but they relinquished the undertaking, because they were interdicted by an oracle. Strabo informs us (l. ix. p. 406, &c.) that canals and pits were dug in Bœotia, at a very remote period of antiquity, for drawing off the water of the lake Copais, which would otherwise have overflowed the whole country. This lake near the sea terminates in three bays, which advance to the foot of mount Ptous, situate between the sea and the lake. From the bottom of each of these bays numerous canals were made to diverge and traverse the mountain through its whole breadth, some of which were more than a league in length, and others of a much greater extent. For the purpose of excavating or of cleansing them, very deep wells had been sunk at stated distances on the mountain. The labour of forming and the expence of maintaining these canals must have been immense. They have since been almost wholly neglected, so that most of them are choked up, and the lake seems to be gaining on the plain. The inhabitants of Babylonia or Chaldæa guarded against the detrimental inundations of the Tigris and Euphrates by a great number of artificial rivers and canals, which served to distribute the waters, to benefit the country

in general, and to effect an easy communication and intercourse between the occupiers of different parts of the country. The Euphrates, according to Ptolemy (l. v. c. 17.), above Babylon, near a town in Mesopotamia, called Sipphara, divides itself into two branches, one running to Babylon, and the other to Seleucia, where it falls into the Tigris. The latter, says Pliny (l. vi. c. 26.), was partly artificial; and he places Seleucia at the confluence of the Tigris and Euphrates, adding that the Euphrates was conveyed to it by a canal. Prideaux, (Conn. b. ii. part i. p. 107.) on his authority, supposes that branch to have been artificial, and ascribes it to Nebuchadnezzar. Between these two branches an artificial canal was cut from the Euphrates, above Babylon, to the Tigris at Apamea, 60 miles below Seleucia. This canal, which was large and navigable, was called *Naarmalecha*, which see. From the Naarmalecha the emperors Trajan and Severus, in their wars with the Parthians, dug a new canal to the Tigris, near Coche on the west, and Ctesiphon on the east side of that river. At the distance of 800 furlongs from Babylon, to the south was another canal, called by Arrian (Exped. Alex. l. vii.) Pallacopas, and by Appian (Bell. Civil. l. ii.) Pallacotta, derived from the branch of the Euphrates that passed through Babylon and conveyed water to certain lakes or marshes in Chaldaea. On this canal, or river, as Arrian calls it, Alexander sailed from the Euphrates to these lakes. Strabo (l. xvi.) describes the course of this canal, without naming it. But it is impossible to trace out, with accuracy, these and the other numerous branches and canals which watered the ancient country of *Babylon*, which see. Many of those that were formerly considerable are now lost; and others have been formed since, that did not exist in ancient times; for a country so much watered, so low in situation, and so subject to the violence of extraordinary inundations from the two large rivers, the Tigris and Euphrates, and so neglected as it has been for several ages, must have often and very considerably changed its face since the time of Ptolemy; and it is almost impossible to describe it such as it was while it continued to be the seat of empire, when the inhabitants were rich enough to take care of its numerous banks, and to keep them in repair. See *BABYLONIA*.

Both the Greeks and Romans proposed to make a canal across the isthmus of Corinth, which joins the Morea and Achaia, and thus to make a navigable passage by the Ionian sea into the Archipelago. Demetrius Poliorcetes, Julius Cæsar, Nero, and Caligula renewed the attempt, but without success. Plin. l. iv. c. 4. After the death of Alexander the Great, Seleucus Nicanor attempted to make a canal between the Euxine and Caspian seas, but his undertaking proved abortive. Travellers, however, assert that traces of very deep vallies are to be seen, through which the canal is said to have passed. Selim II. and Peter the Great, renewed the attempt, but they were prevented from succeeding, not so much by the impracticability of the scheme as by other collateral circumstances. The Romans, more intent on conquests than on commerce and the arts, afford us few instances of canals for internal navigation. We find, however, that Drusus, under the emperor Augustus, having conceived the design of marching into Germany without harassing his troops by a long and difficult march, facilitated the execution of it by making a canal that communicates from the Rhine with the Issel, extending from the village of Isehoort to Doefbourg. This canal received a great part of the waters of the right branch of the Rhine, which became by that means much less considerable. At the same time he opened a third mouth from that river into the sea, mentioned by Pliny under the name of "*Flevum Offium*." But the face of the country has been much altered from that time. Lu-

cius Verus who commanded the Roman army in Gaul under Nero, attempted to make a canal between the Moselle and the Rhine. Corbulo under Claudius employed his soldiers in digging a canal between the Rhine and the Maese, though an interval of about 23 miles, in order to preserve the country from inundations, and to serve as a drain, in case of any extraordinary overflowings of the sea. Cluverius and Cellarius suppose this to be the canal that begins at Leyden, passes by Delft, continues on to Maesland, and joins the Maese at the village of Sluys. Claudius also employed 30,000 men for about 12 years in digging a canal through a mountain for draining the lake Fucinus (now Celano) into the river Liris; and in 1789 this canal was begun to be cleaned to the great relief of the neighbouring country, which was inundated by its obstruction. The Romans, during their residence in this country, made a canal between the Nene, a little below Peterborough, and the Witham, 3 miles below Lincoln, called by the modern inhabitants "*Caerdike*," which is now almost wholly filled up. It was almost 40 miles long, and, as far as we may judge from the ruins, very broad and deep. Some have supposed it to be a Danish work. J. Morton supposes it to have been made under the emperor Domitian. Urns and medals have been discovered on the banks of this canal, which seem to confirm that opinion. Morton's Hist. Northamptonshire, ch. 10. Charlemagne, at a later period, formed a design of joining the Rhine and the Danube, and of thus making a communication between the ocean and the Black sea, by a canal extending from the river Almutz, which discharges itself into the Danube, to the Reditz, which falls into the Maine; and the Maine joins the Rhine near Mayence. In the execution of this design he employed a great number of workmen, but he was prevented from completing it by a variety of obstructions which occurred. Of all the countries to which ancient history directs our attention, Egypt was the most distinguished by its numerous canals, which, according to Savary, amounted to 80, several of which are 20, 30, and 40 leagues in length. These served to receive and distribute the waters of the Nile, at the time of its inundation. Most of these are neglected, and, consequently, one-half of Egypt deprived of the means of its cultivation. The canals which convey the water to Cairo, to the province of Faioum, and to Alexandria, seemed to have engaged the chief attention of government. "An officer," says baron De Tott (Memoirs, vol. ii. p. 21, &c. Eng. ed.) "is appointed to watch this last, and hinder the Arabs of Bachria, who receive the superfluous waters of this canal, from turning them off before Alexandria be provided, or opening it before the time fixed, which would hinder the increase of the Nile. That which conveys the waters into Faioum is watched in like manner, and cannot be opened before that of Cairo, which is called the canal of Trajan." But the principal of these works was the Grand Canal, by which a communication was made between the Nile and the Red sea. This was begun, according to Herodotus (lib. ii. p. 181, &c. ed. Wesfelingii.) by Necos, the son of Psammitichus, who desisted from the attempt on an answer from the oracle, after having lost 120,000 men in the enterprise. Strabo (lib. xvii. p. 1157. ed. Casaubon.) ascribes the commencement of it to Scylax, before the Trojan war. It was resumed and carried on by Darius, son of Hystaspes, who relinquished the work on the representation made to him by unskilful engineers, that the Red sea being higher than the land of Egypt, would overwhelm and drown the whole country. Diodorus Siculus (lib. i. p. 39. ed. Wesfelingii.) gives the following account of this canal. "A canal of communication has been cut, which passes from the gulf of Pelusium to the Red Sea. It was begun by Necos,

Necos, the son of Pfammitichus, and continued by Darius king of Persia; but left imperfect in consequence of the advice of some persons who asserted that it would lay Egypt under water, because the land was below the level of the Red sea. Ptolemy II., however, finished the undertaking, and constructed, in the most convenient part of the canal, a dam, or sluice, ingeniously contrived, which opened to give passage, and immediately closed again. Hence the river which discharges itself into the sea, near the city of Arsinoe, has received the name of Ptolemy." From this passage, says baron De Tott, it is plain, that the sluices still existed in the time of Diodorus. The entrance of the canal near Suez yet remains, and might easily be rendered navigable, without employing sluices or locks, as the difference of the level is very small, and without endangering Egypt with inundations. This part of the isthmus, says the baron, affords land very favourable for such an excavation, through the small interval of 12 leagues, which separates the Arabian gulf from the arm of the Nile which approaches it, and afterwards falls into the Mediterranean at Tineh. Strabo adds (*ubi supra*) that this canal was afterwards cleaned by Trajan. Its width, being 100 cubits, of 22 inches to a cubit, was sufficient for admitting the passage of two galleys abreast; and its depth was such as to bear the largest vessels. Pliny, in his account of this canal, (*lib. vi. cap. 29.*), states its breadth at 100 feet, its depth at 40, and its length to the bitter fountains (near Arsinoe) at 37 miles. By means of this canal, the valuable commodities of India, Persia, Arabia, and the kingdoms on the coast of Africa, which were brought by shipping to the Red sea, were conveyed to the Nile; and thence distributed by the Mediterranean not only to Greece and Rome, but to all the surrounding nations, until the Portuguese discovered a passage to India by the Cape of Good Hope. It did not, however, long serve the useful purposes of commerce, which were at first expected. Merchants were dissatisfied with the delay occasioned by going to the very bottom of the gulf, and afterwards with the inland navigation of the canal, and that of the Nile, to Alexandria. They found it much more expeditious to unload at Berenice, near the coast of the Red sea (see BERENICE): and after three days' journey, to send their merchandize directly down to Alexandria. Accordingly, this canal was disused, and goods were conveyed from Berenice to the Nile by land; a mode of conveyance occasionally used at this day. Strabo and others have asserted, that this canal was again opened about the year 635, by Amru, governor or prefect of Egypt, under the caliph Omar, for the conveyance of the corn of Egypt to Arabia, which was then grievously distressed by a famine. Elmacin, or Al Makin, says, that a new canal was opened for this purpose, and called by Amru the river of the emperor of the faithful; but it has been more generally supposed, that he only renewed the ancient canal, the navigation of which, towards the decline of the Roman empire, had been much neglected. The authors of the *Modern Universal History* (*vol. i. p. 333.*), discredit the relation of Elmacin and Eutychius; and allege that there never was any passage for vessels dug between the towns of Al Fostat, on the eastern bank of the Nile, and Al Kolzom or Colzum on the Red sea. The river, or rivulet, denominated by them the river of the emperor of the faithful, say these authors, was undoubtedly no other than the Amnis Trajanus of Ptolemy, or the Khalig, which annually supplies the city of Cairo, as well as the neighbouring country with water. For the present state of this canal, see CAIRO. They suppose, therefore, that, on the occasion now referred to, the caliph Omar ordered Amru to make the Khalig more navigable, by clearing it of the gravel or sand with which it was then

choaked up; and that, for this reason, it received the name of the river of the emperor of the faithful. Elmacin farther informs us, that the Alexandrian canal was stopped again, at the end next the Red sea, by the caliph Abu Jaafar, or Almanfor, in the year of the Hegira 150, A.D. 767. Some traces of this canal are still subsisting; and M. Boutier, in 1703, discovered that end of it, which rises out of the most easterly branch of the Nile. *Hist. Acad. Sc. for 1703, p. 110, &c.*

The canal of Alexandria, cut from the Nile to this city by Ptolemy, during the inundation of the Nile, receives its water at Latf, opposite to Fouah, and has three bridges over it, of modern construction. Near the former, by the sea-side, is the entrance of the subterraneous aqueduct, that carries a supply of water for the Alexandrians into the cisterns, the arches of which supported the whole extent of the ancient city, but they are now incapable of being traced out. The mouth of this aqueduct is now blocked up; but when the water of the canal had arrived to a certain height, in consequence of the rise of the river, the principal magistrates of the city went in great ceremony to break down the dam. When the cisterns were full, it was again built up, and the water of the canal continued to fall into the sea at the old port. It was by this easy communication that merchandize was formerly conveyed through Egypt. The dangerous passage of the mouth of the Nile was thus avoided, as well as the perils of the sea. But beside furnishing the city with water, and facilitating its commerce, this canal, which passed along the upper part of the cultivated lands, on the left hand of the Nile, contributed very much to their fertility. In process of time it was shamefully neglected. However, it was cleaned by order of Bonaparte, in his irruption into Egypt, as far as Rhamania. See ALEXANDRIA.

Egypt is intersected in various directions by many other canals. Several of them issue from that arm of the Nile which runs to Damietta, and contribute to fertilize the province of Sharkia, which, making part of the isthmus of Suez, is the most considerable of Egypt, and the most capable of a great increase of cultivation. Others run through the Delta, and of these, says baron De Tott, many are navigable. The canal of Menouf communicates with the two branches of the Nile, 10 leagues below the angular point, called the "Belly of the cow." See MENOUF. The canal of Bahira proceeded from the lake Mareotis, near Alexandria, and having sent off branches which joined the western branch of the Nile at Eshlim, Shabur, and Nadir, passed on to Upper Egypt. The other principal canals of Egypt will be mentioned in connection with the towns or districts to which they belong.

There is no country on the face of the globe that abounds more with canals and navigable rivers than CHINA: to which article we shall refer an account of its inland navigation. Hindoostan likewise furnishes instances at a remote period of the acknowledged importance and utility of canals. As the country between Dellhi and the Panjab was scantily supplied with water, the emperor Feroze III., who died in 1388, undertook, says major Rennell (*Memoir, p. 71.*), the noble, as well as useful, task of supplying it better, and at the same time of applying the water, so furnished, to the purposes of navigation.

The immediate object of the canals, projected and executed by Feroze, for an account of which we refer to Rennell (*ubi supra*) seems to have been the junction of the Setlege and Jumnah rivers, through an interval of 240 geographical miles, and remotely that of the Indus and Ganges. If this grand design of Feroze had been completed, it must have ranked with the greatest works of this kind; "for we should

should then have seen two capital rivers, which traverse a large part of Southern Asia, which enter the sea at the distance of 1500 British miles asunder, and which stretch out their arms, as it were, to meet each other, united by art: and those by nature to a third; so as to form an uninterrupted inland navigation from the frontiers of China to those of Persia." The country of Bengal is so intersected in various directions by the natural canals of the Ganges and Burrampooter rivers, together with their numerous branches, as to form the most complete and easy navigation that can be conceived: and it is supposed, that this inland navigation furnishes constant employment for 30,000 boatmen, who are employed in conveying by water through the kingdom of Bengal and its dependencies, all the salt and a large proportion of the food consumed by 10,000,000 people, and in transporting commercial exports and imports, probably to the amount of 2,000,000l. sterling per annum.

The improvement of inland navigation engaged but little attention in Russia before the reign of Peter the Great. With him, after his return from Holland, where he had observed its useful effects, the construction of canals became a principal object. Of those projected and hastily executed by him, we may mention that of Cronstadt, that of Ladoga, that of Vishnei-Voloshok, and that for forming a communication between Moscow and the Don. For an account of the canal of Cronstadt, which was left unfinished by czar Peter, see CRONSTADT. The Ladoga canal was begun in 1718 by his order, and finished during the reign of the empress Anne. It was carried out first only as far as the Kaborona, a rivulet which enters the lake to the east of Schlusselfburgh; but now reaches, without interruption, from the Volkof to the Neva. The length is $67\frac{1}{2}$ miles, and its breadth 70 feet; the mean depth of water in summer is seven, and in spring ten feet; it is supplied by the Volkof and eight rivulets. The barks enter through the sluices of the Volkof, and go out through those of Schlusselfburgh. In 1778, four thousand nine hundred and twenty seven vessels passed through this canal. A scheme has been projected, and in part executed, for uniting the White Sea and the Baltic, and thus improving the commerce between Archangel and Petersburg, by forming a communication between the Ladoga and Beilo-Ozero to the Duna. The canal of Vishnei-Voloshok, forms a communication by water between Astracan and Petersburg, or between the Caspian and the Baltic. This canal was begun and completed under Peter the Great; but it has been considerably improved by the empress Catharine, so that vessels reach Petersburg in half the time which they formerly employed. In order to form an idea of the course of this inland navigation, a map of Russia should be consulted; and it will be seen, that the river Shlina forms the lake Mastino, which gives rise to the Mastia; this, after a course of 234 miles falls into the lake Ilmen, from which issues the Volkof; and this, running 130 miles to the lake Ladoga, supplies the Neva; so that, in effect, the Shlina, the Mastia, the Volkof, and the Neva, may be considered as the same river flowing into and through different lakes. By uniting, therefore, the Shlina, which communicates with the Baltic, with the Tvertza, which flows by the Volga into the Caspian, the canal of Vishnei-Voloshok completes the communication between these two seas. In autumn the navigation from Vishnei-Voloshok to Petersburg is performed in little more than a month; in summer in three weeks. In one year 3485 barks have passed through this canal.

The grand project of uniting the Caspian and the Baltic with the Black Sea, by the junction of the Don and Volga, was planned by Peter the Great. These two rivers approach each

other within the distance of 40 miles in the province of Astracan; and two rivulets, the Illosa which falls into the Don, and the Camashinska falling into the Volga, are separated only by an interval of five miles. If these rivulets could be made navigable, and united by a canal, the Black Sea would be joined with the Caspian and Baltic. Repeated attempts have been made for this purpose, but they have hitherto failed. However, as the Volga and the Don are but 40 miles distant, and land carriage in this country is very cheap and easy, the advantages resulting from the projected canal would be scarcely equivalent to the expence of forming it. In 1802, a beautiful chart was published, exhibiting a view of all the canals in Russia, that have been formed between the White and Black Sea, and between the Baltic and the Caspian. The inland navigation is already carried through such an extent in Russia, that it is possible to convey goods by water 4472 miles from the frontiers of China to Petersburg, with an interruption only of about 60 miles; and from Astracan through a tract of 1434 miles. Cox's Travels in Poland, Russia, &c. vol. iii. Tooke's view of the Russian Empire, vol. i.

The first sovereign of Sweden, who duly appreciated the utility of inland navigation, was Gustavus Vasa. Having made Lodefe (now Gotheborg) a staple-town of trade, he conceived hopes, that in order to prevent the merchant-ships bound to Sweden from being obliged to sail through the Sound, the merchandize might, at some future period, be transported from thence to Stockholm, by means of the Wenner, Hiemar, and Mæler, when the rivers and lakes uniting with them should be rendered navigable. Eric XIV. desirous of executing his father's plans, directed a survey to be made of the waters communicating with those lakes, and plans to be formed for joining them by artificial canals. But the turbulence and misfortunes of his reign frustrated the accomplishment of his designs. The same object was kept in view by succeeding sovereigns. Charles IX. promoted it by the Carlsgaf canal, and Charles XI. by that of Arboga. Gustavus Adolphus wished to encourage the design, but could not find persons competently qualified to execute it: and Charles XI. was discouraged by the report of Dutch engineers, who declared it impracticable. Charles XII. however, approved the proposal of the celebrated engineer, Polhem, for rendering the cataraets of Trollhætta navigable, and for opening a communication, not only between Gotheborg and Stockholm, but also with the Wenner, the Vetter, and Nordkiöping, sufficient for the passage of large vessels. The execution of this plan was immediately begun by his order, and, after his death, revived by Adolphus Frederic. It comprehended three principal parts; viz. the junction of the Mæler and the Hiemar, of the Hiemar and Wenner, and of the Wenner with the German Ocean. The two lakes of the Mæler and Hiemar are united by the Ulvifon, and the canal of Arboga. This canal (see ARBOGA) is, for the most part, of sufficient breadth to receive two barks a-breast, and its lowest depth is eight Swedish feet. It is chiefly supplied with water from the lake Hiemar, which is 80 feet higher than its level; and this fall is broken by eight sluices. With a view of joining the Hiemar and Wenner, many schemes were proposed, but difficulties occurred which prevented the completion of them. The junction of the Wenner with the German Ocean has been attempted by the Carlsgaf canal, the canal of Trollhætta, and the sluices of Akerström and Edet. The Carlsgaf canal, so called from Charles IX. who commenced it, connects the Wenner with that part of the Gotha, where it is first navigable. In 1768 a new sluice to supply the place of that of Polhem, carried away by the water, and of that

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called Tefsin, found insufficient, was completed; and denominated the sluice of Gustavus. This superb work is a cut of 400 feet, partly perforated through the solid rocks, and consisting of two locks, each 200 feet long, and 36 broad; the sides being strongly faced with brick and stone. The greatest depth of water is 13, and the lowest six feet. This canal is commonly navigated by vessels of 80 tons burden. From the end of this canal to the village of Trollhætta, including an interval of five miles, the navigation of the Gotha is uninterrupted; but when it bursts at once into the cataracts of Trollhætta, called the "gulfs of hell," all farther navigation becomes impracticable through a space of about two miles. Here it is divided into four principal cataracts, separated by whirlpools and eddies, and descending through a perpendicular height of 100 feet. Nevertheless, an attempt has been made to form a canal through these cataracts. The first attempt, after much labour and expence, failed; and another plan was adopted. The length of the canal was to be 4700 feet, its breadth 36, and its depth in some parts above 50; and it was to consist of nine sluices; but the whole of the cut was to be excavated through a bed of red granite; and though it should not be condemned as impracticable, the difficulties attending it appear to be almost insuperable. After all, it has been doubted, whether the enormous expence attending the execution of it will be compensated by the advantages resulting from its completion. Gustavus III., soon after his accession, visited the works, and ordered all of them to be suspended, except the sluices of Gustavus and Aker. But, in order to facilitate the conveyance of merchandise from the districts bordering on the Wenner to Gotheborg, a wooden road has been constructed on the side of the river, from the beginning to the end of the cataracts. About a mile below the cataracts, the course of the Gotha is again interrupted by a fall, called Akerstrøm; and here a canal has been made through a rock, 182 feet long, including the sluice, 26 deep, and 36 broad. From Akerstrøm the river is clear to Gotheborg, excepting at Edet, where it is intercepted by a bed of rocks. On one side of these rocks another cut has been made, 600 feet long, 20 deep, and 18 broad. The iron and other merchandise are now transported across the lake to Wennerborg, through the Carlsgaf canal, and down the river Gotha to Trollhætta. At the cataracts they are unloaded, carried over the wooden road two miles to the end of the falls, again embarked, and passing through the Akerstrøm and Edet sluices, arrive without further impediment at Gotheborg. Coxe's Travels, vol. iv.

The principal canal of Denmark is that of Kiel. This canal was designed to complete the inland navigation, which, for the purpose of facilitating the communication between the Baltic and the German Ocean, is formed across the duchy of Holstein, and it unites with the river Eyder, which passes by Rendsburgh, and falls into the German Ocean at Tonningen. It begins about three miles N. of Kiel, at the mouth of the river Lewensawe, which heretofore separated Holstein from Sleswic, and will become a new boundary between these two duchies. The distance from its beginning to the east sluice at Rendsburgh is 27 English miles; but as the Eyder is navigable about $6\frac{1}{2}$ miles above Rendsburgh, the cut necessary for completing the communication between the two seas is only $20\frac{1}{2}$ miles. It was begun in 1777, and was opened in 1785. The perpendicular fall towards the Baltic is 25 feet six inches; that towards the ocean 23; and the vessels will be raised or let down by means of six sluices. The breadth of the cut is 100 feet at the top, and 54 at the bottom; the sluices are 27 feet broad and 100 feet long, and the lowest depth of water is 10 feet. Mer-

chantmen of about 120 tons burden will be able to navigate this canal. The utility of this important undertaking is indisputable. At present, even the smallest vessels, trading from any part of the Danish dominions in the Baltic to the Northern Sea, must make a circuit round the extremity of Jutland, and are liable to be detained by contrary winds. This navigation is so tedious, that goods shipped at Copenhagen for Hamburg are not unusually sent by sea only to Lubec, and from thence by land. The object, says Mr. Coxe, of those who planned this canal, was to draw by Kiel into the Baltic, the commerce of Bremen, Hanover, and Westphalia, which is now carried down the Weser, and by Glückstadt upon the Elbe, to Hamburg and Lubec; and to facilitate the transport of merchandise from Holland and the North Sea to the ports of the Baltic. But the difficult navigation of the Eyder between Rendsburgh and Tonningen, occasioned by numerous shoals of shifting sands, will prevent the complete success of this canal. Ships sailing from the Baltic to English or French ports, will without doubt prefer the navigation round the Cattegat, with all its dangers and difficulties. The trade of Kiel, however, will at all events be greatly increased by this canal; but the principal depository of the merchandise will be at Rendsburgh. Coxe's Travels, vol. v.

The canals of Holland and Flanders are innumerable; and they serve the purpose of our public roads, so that the inhabitants may travel by means of them in their trekschuyts and barges, and convey commodities for consumption or exportation, from one part of the country to another, as occasion requires. An inhabitant of Rotterdam, it is said, may, by means of these canals, breakfast at Delft or the Hague, dine at Leyden, and sup at Amsterdam, or return home again before night. By them also a prodigious inland trade is carried on between Holland, France, Flanders, and Germany. When the canals are frozen over, they travel on them with skaits, and perform long journeys in a very short time, while heavy burdens are conveyed in carts and sledges, which are then as much used on the canals as in our streets. The profits which have accrued from these canals have been immense; and their amount almost exceeds belief. It is said, that they have yielded more than 250,000*l.* for about 40 miles of inland navigation. The canals of Holland are generally 60 feet wide, and six deep, and are kept cleaned; the mud, as manure, being very profitable. They are generally level, and need no locks; and they are commonly elevated above the country for the purpose of carrying off the waters, which in winter inundates the land. In the province of Delftland, not more than 60 miles long, 200 wind-mills are employed in spring to raise the water into the canals. On the dams or banks by which they are bordered, and which are kept in repair at a very considerable expence, depends the security of the country from inundation. The canals of Flanders, ever since their trade has declined, and the cities erected on their banks have decayed, have been very much neglected. They indicate, however, the former flourishing and prosperous state of the country. So early as the 12th century, large canals were cut; and they answered the purpose of inland commerce as well as of draining the land. The spacious canal of Brussels, begun in 1531, and completed in 1560, extends from this city to the Scheldt, which opens a communication with Holland, and by the canals of Flanders with the ocean. The canals of the other Dutch and Flemish towns will be mentioned under their respective articles.

France has from a very distant period exercised its ingenuity and activity in the construction of canals for inland navigation. We must content ourselves with a cursory mention

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mention of some of the principal. The canal of Briare, called also the canal of Burgundy, was begun under Henry IV. and finished in the reign of Louis XIII. It opens a communication between the Loire and the Seine, and then between Paris and the western provinces. Commencing at the Loire near Briare, it passes to Montargis, joins the canal of Orleans, which was begun in 1675, and has 20 sluices, and falls into the Seine near Fontainebleau. It has 42 locks and sluices; and is of great use in inland commerce. The canal of Picardy connects the river Somme with the Oise; and beginning at St. Quintin, joins the Oise, and affords a ready conveyance to Paris for the grain of Picardy, the sea-coal, wood, butter, copper, and spices from the northern provinces of the kingdom, and from Holland. The most considerable work of this kind is the canal of Languedoc, called the canal of the two seas, which forms a junction between the Ocean and the Mediterranean. It was first projected under Francis I., but begun in 1666, and finished in 1681, under Louis XIV., during the ministry of Colbert, and by the skill of Riquet, the engineer. It established a ready communication between the two fertile provinces of Guienne and Languedoc, and extends from Cattee in the bay of Languedoc, to the Garonne below Thoulouse, being provided at proper intervals with 114 locks and sluices. In some places it is conveyed by aqueducts over bridges, under which other rivers pursue their course. Near the town of Beziers, it was conveyed under a mountain by a tunnel, then thought singular and extraordinary, but now common, 720 feet in length and lined with free stone. At St. Ferriol it derives a supply of water from a reservoir containing 595 acres. Its breadth is 144 feet, including towing-paths; it is six feet deep, and its length 64 French leagues, or about 180 miles. The expense of its construction was about 540,000*l.*, defrayed partly by the king, and partly by the province of Languedoc. On the reduction of the army and navy in 1782, after the conclusion of the American war, the disbanded soldiers and seamen were employed in the construction of three navigable canals; viz. one, called the canal of Dehune, extending from Chalon-sur-Saone to the town of Dijon on the Loire, through an interval of 21 leagues, and forming a junction with the Saone and the Rhone: a second, called the canal of Burgundy, reaching from St. Jeane-de-l'Aune to the village of Roch, between St. Florentine and Joigny, through a space of 52 leagues, and opening a communication between the Saone, the Rhine, the Yonne, and the Seine; and a third, called the canal of Neuf-Brissac, which commences at the village of St. Symphorin, on the Saone, and passing the city of Besançon, is continued below Strasburgh, forming a junction of the Saone with the Rhone, and of the Ill with the Rhine. By these canals goods may be conveyed at a cheap rate from Marseilles, the Mediterranean, Italy, and Switzerland, to the bay of Biscay and the Ocean, and also to Holland and Germany, as well as to Flanders and the Austrian Netherlands; and during any future war with England, France will be able to supply, by these canals, her dock-yards at Marseilles and Toulon, and also her grand arsenal and dock-yards at Brest and Rochfort, with all sorts of commodities from the Baltic, without hazarding a voyage by sea. It would be endless to enumerate all the canals, projected or actually executed in France, and forming an easy intercourse between the different districts of this extensive country. A survey has lately, in 1802, been made of the little river Buzeg or Bureg, with a view of its being brought to Paris in the same manner as the New River is brought to London, and of being laid into the streets and houses by pipes, fire-plugs, and engines, for the purpose of cleansing the streets,

as well as accommodating the houses. Phillips's *Inland Navigation*, p. 75. 8vo.

Spain has not been altogether inattentive to the improvements likely to result from inland navigation. At former periods it has been often proposed to dig a canal through the isthmus of Darien, from Panama to Nombre de Dios, and thus to make a ready communication between the Atlantic and the South Seas, and to open a straight passage to China and the East Indies. The project, however, has been considered as chimerical, and treated with ridicule. The improvements meditated at home are of much greater importance: but though the inland navigations of Spain have been commenced upon principles both of grandeur and utility, they have been suffered to languish through the want of resources, and the tardy measures of the court. The great canal of Arragon afforded, in 1785, some hopes; but it seems to remain in an imperfect state. Two branches, however, are completed: those of Tautre, and the imperial canal, both of which begin at Navarre and terminate in the river Ebro, and they have already proved sources of industry to all the districts through which they flow, and rendered the fields fertile. One of these canals is conducted over the valley of Riojalon, by an aqueduct 710 fathoms in length, and 17 feet thick at the basin. Another canal called the canal of Castile was projected to begin at Segovia, about 40 miles N. of Madrid, and to extend to the bay of Biscay, through a distance of 140 leagues. This canal is 56 feet wide at the top, 20 feet at the bottom, and nine feet deep, but the completion of it will require many years. The canal of Guadarama was planned in 1784, and being conducted with spirit, is probably now completed. It was to commence at the foot of the mountains of Guadarama, near the Escorial, and to proceed to join the Tagus, afterwards, the Guadiana, and terminate at the Guadalquivir, above Anduxar. Another canal was also begun to join the river Manzanares to the Tagus; but the work was suspended. The canal of Murcia was found, after its commencement, to be impracticable. Phillips's *Inland Navigation*, p. 75, &c.

The Americans possess a country capable of great and easy improvement by internal navigation. To this object they are not inattentive. For an account of their projects and actual progress in this business, we must refer to Phillips's *Inland Navigation*, p. 571, &c., or to the Journals of Mr. Elkanah Watson.

CANALS, *the British*; from the great influence which they appear to have had, among other causes, during the last half century, in promoting the rapid increase of our commercial greatness as a nation, have induced us to lay before our readers a very full account, not only of the present existing canals, but of the principles and practice of canal making, in the united kingdoms. As very few of the English, Welch, Scotch, and Irish rivers, are of sufficient magnitude, and free from shoals, to answer the purposes of navigation far into the country from the sea, without the aid of art, conducted upon similar principles to those used in canal-making; and as nearly all our canals connect with the navigable rivers, and act in some measure, as extensions of them further into the country, we have found it expedient to include under this article, whatever we have been able to collect on the subject of the *Inland Navigation of the United Kingdom*.

That the navigation of our rivers, by ships or smaller vessels has long been an object of considerable importance, will appear from *magna charta*, which has made a special provision in the 23d chapter, for the putting down of weirs and other obstructions in the rivers of England; and from stat. 25. Edw. III. c. 4. which sets forth, that "whereas the com-

mon passages of boats and ships in the great rivers of England, be oftentimes annoyed by inhanfing gores, weres, flakes, &c. in great damage of the people: it is established, the same shall be cut and utterly pulled down, without being renewed, and that writs be sent to the sheriffs to do execution." After two other unsuccessful attempts by statutes in the succeeding reigns, to prevent the free navigation of the rivers from being obstructed by individuals, intent upon fishing, embanking land, or building mills, bridges, or making fords, the statute of the 4th of Henry I. chap. 12, appointed special commissioners for carrying the above statutes into effect; whose powers were continued and enforced by two other acts, prior to the 23d of Henry VIII. chap. 5. which being entitled, "The Bill of Sewers with a proviso," appointed a general commission of sewers, with large powers that are still in force and acted upon, for making laws and ordinances, and compelling obedience thereto, for the "removing and preventing of impediments and annoyances on rivers, streams, and floods, whereby the passage of ships and boats might be letted or interrupted." And by the statute of Edward VI. chap. 8, the last mentioned and former statutes were confirmed and made perpetual. During the above period, several other statutes were also made, for removing obstructions in particular rivers, of some of which we shall have occasion to speak when we come to mention those rivers.

The general laws of the land proving so very ineffectual for protecting internal navigation from the encroachments of individuals and the effects of neglect, this probably suggested the propriety of those particular grants or statutes which we find enabling corporations, and in some instances individuals, to take particular rivers under their charge, and to receive tolls or dues from the vessels navigating within their particular district. In process of time, as population increased, and the advantages of water carriage became more apparent, further grants and acts of parliament were made, authorising companies or individuals to extend the navigation on certain rivers further into the country, generally to reach some city or great town; these acts, some of which we shall particularize hereafter, generally enabled the parties to deepen, and in some instances to straiten the course of their rivers, to embank them where too wide, to erect jetties and sluices, to make flashes for surmounting the shallows or rapids, and in later times to erect pound-locks for gaining the ascent to the different mill-dams upon the river. But the constant tendency of rivers, especially rapid ones, to cast up banks of sand or gravel in particular places, their deficiency of water in times of drought, and superabundance in times of flood, the ravaging effects of these last in destroying the works erected for the use of the navigation; as happened on the river *Avon* between Christchurch and Salisbury; on the river *Stour*, between the Severn and Stourbridge; on the river *Calder*, between Wakefield and Eland, and on several others which might be mentioned; the great labour and difficulty of towing or dragging vessels against the stream, especially where there was not a towing-path for horses, near to the channel of the river, and yet not subject to be overflowed and rendered useless in time of floods; the very lengthened course of most rivers, arising from their serpentine, and, in some instances, varying channel, was not also among the smallest of the difficulties attending them: these, at length, suggested the propriety of leaving the bed of the rivers in some instances for a new cut for the navigation across a neck of land, with a pound-lock at its lower extremity. As these side cuts and pound-locks were increased in number, to shorten the course of the rivers, their superior advantages be-

came so apparent, that a company of gentlemen and merchants, who had in 1755 obtained an act of parliament authorising them to make *Sankey Brook* navigable from the Mersey river to near St. Hellins, in Lancashire, with the powers at that time usual in navigation acts, for the purchasing of land and other things necessary for the intended navigation, at a fair estimate to be made by commissioners named in the acts; they determined, after mature deliberation, to avoid the bed or channel of the brook altogether, and to make one entire new cut or canal, as near as convenient to the bed of the river, with locks thereon, in such places as the falls of the ground should render necessary; and this canal they accordingly effected about the year 1760, supplying its highest pound or level with water, by a cut or fender from the Brook. Thus navigable canals had their rise in England; but, a less fortunate set of gentlemen, who under the power of an act obtained in the year 1730, for making the river *Stroudwater* navigable, from the river Severn to near the town of Stroud, although the act empowered them "to make as many new cuts as they may judge proper, and of what length and breadth they shall think convenient;" yet when they had, about the year 1774, determined upon following the example of the *Sankey* proprietors, and in imitation of the duke of *Bridgewater's*, and several other canals, which had then been executed or were begun; by cutting a canal on the side of the *Stroudwater* river, they were stopped by an expensive law-suit, carried on by certain mill and land-owners in the neighbourhood: whereby the distinction between the river navigation acts, and canal acts was established by the Court of Exchequer, before which the case came to be argued.

About the year 1757, the *Duke of Bridgewater*, acquainted fully, no doubt, with what had been near 80 years before effected, on the canal of Languedoc, in the South of France, and since in different parts of the Continent, conceived the idea of a canal for the purpose of conveying coals from his estate at Worsley in Lancashire, to Salford near Manchester. His grace, profiting as no doubt he did, by the works of that great French engineer, *Francis Riquet*, and by the advice of that great natural and self-taught genius *James Brindley*, whom his grace called off, about the year 1758, from his employment as a mill-wright and engine-maker in this country, to perfect, and carry into execution, the great and important schemes which he had projected, and for which he proposed and brought into parliament the first act, with powers adequate to the great and extraordinary undertaking, of cutting a canal of several miles in length, not in the direction of any river or stream of water, but crossing the course of several brooks, roads, &c. and through the lands of a vast number of different persons, all of whom were to be fully compensated, though deprived of the power of withholding their lands or waters, or in any way obstructing the design. In these respects, the *Duke of Bridgewater* has not improperly been called the father of canals in England, while his engineer, the late *Mr. Brindley*, by his masterly performances on the *Duke of Bridgewater's* canal, altered and extended as the scheme thereof was, by three subsequent acts of parliament, has secured to himself, and well it should seem, from a comparison of the great features, and minutiae of execution in this the first canal, with most others in this country, even of the latest construction, long continue to hold, that rank among the English engineers, to which *M. Riquet* seems entitled among foreigners.

The course, thus happily opened by the *Duke of Bridgewater*, was quickly followed by new sets of adventurers, who were seen applying to parliament in almost every session, for powers to raise a joint stock on transferrable shares, and

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to make and maintain canals in most parts of the kingdom, many of which have been long completed, as our subsequent account of them will shew, and have contributed in a most eminent degree to the improvement of the country, as well as to the enriching of the individuals concerned in a great number of instances; in the laudable zeal of adventurers to extend, and of the people of great towns and proprietors of mines and great manufactories to receive, the benefits of inland navigation; numerous schemes have been adopted, where from the actual scarcity of water, or its previous appropriation to mills, a canal with locks was impracticable. One of the first of these schemes for dispensing with locks, was that of *Mr. Bridge*, about the year 1759, upon the *Stroud-water* river before mentioned, where the cargoes of the boats were disposed in a number of boxes or frames, just adapted to the size of the boats; which boxes of goods were drawn up by cranes to be lodged in other boats on the higher level, and the reverse in descending; which method was afterwards more successfully practised on *Bridgewater's* canal at *Worsley*, at *Briely Hill* on the *Shropshire* canal, and other places. The next mode seems to have been adopted by *Mr. Davis Drekart*, near the *Tyrone* collieries on the intended connection with *Blackwater* navigation in Ireland, about the year 1776; and afterwards by *Mr. William Reynolds* on the *Ketley* canal, where the boats were dragged up or let down inclined planes, not very different from the rolling bridges, long before in use in Holland and Flanders.

The necessity of an expeditious and cheap mode of conveying coals from the pits to the keels or ships, had, as early as the year 1680, introduced the use of wooden rail-ways, for the waggons to move upon, between the *Tyne* river and some of the principal pits, and these by degrees became extended to a great number of other coal-works. Since the more general introduction of cast iron, and its cheaper conveyance by means of canals, iron rails have been substituted in the place of the wooden ones before mentioned; and the use of inclined planes, or parts of the rail-way having a much greater declivity or slope than it is practicable to drag carriages up by means of horses, has become very frequent in parts where the rise of the ground required it, machinery being on these inclined planes adopted to supply the place of horses.

Several years ago, an act of parliament was obtained by *Homfray, Hill, and Co.* for an iron rail-way, or tram-road from *Cardiff* to *Merthyr*, by the side of, and as a rival scheme of the *Glamorganshire* canal, for 9 miles or more in length; since which, several other acts have been passed for rail-ways, and several of them executed, to the great benefit of the country, and the companies who constructed them; it has also become common within the same period, to authorise canal companies to construct rail-ways, as collateral branches from their canal, to mines or other great works or to large towns within certain distances of such canals; by which their benefits have been amazingly extended: most of the latter acts have also authorised the adoption of rail-ways, of inclined planes, or of any of the expedients above-mentioned, or others as substitutes for locks, in such parts thereof, as are not readily to be supplied with water, adequate to the waste which locks occasion. So many of these compound schemes for lessening the expence of carriage have been already executed, or are in hand, that we have found ourselves compelled, in order to present our readers with a connected and useful view of the subject, to include what we have to say on the subject of *rail-ways*, in the present article, as well as treat therein of *navigable rivers*, for the reasons before stated.

Great Britain as well as every other island, and even a

continent taken as a whole, has a range of high land passing nearly its whole length, which divides the springs and rain waters that fall to the opposite coasts: we shall call this range dividing the eastern and western rivers of Britain the *grand ridge*, and shall in our accounts distinguish on which side, or how each canal is situate, in respect thereof: and here it will be proper to remark, that no less than 22 of our canals now do or are intended to pass this grand ridge, forming as many navigable connections between the rivers of the east and west seas! these are the *Inverness and Fort-William*, *Forth and Clyde*, in Scotland; the *Leeds and Liverpool*, *Rockdale*, *Huddersfield*, *Trent and Mersey*, *Staffordshire and Worcestershire*, *Wyrley and Essington*, *Birmingham*, *Dudley*, *Worcester and Birmingham*, *Stratford*, *Warwick and Birmingham*, *Coventry*, *Grand Junction*, *Oxford*, *Thames and Severn*, *Wilts and Berks*, *Kennet and Avon*, *Dorset and Somerset*, *Grand Western*, and *Bude and Launceston*, in England: and what is not a little remarkable is, that the *Dudley* canal crosses this grand ridge twice, the two ends being on the eastern side, and the middle part on the western side thereof; the *Kennet and Avon* crosses the eastern and western branches, into which it divides on the Chalk Hills, west of *Marlborough*, by which parts of this canal are in the drainage of the west, the south, and the east seas! the *Coventry* canal also, by means of its *Bedworth* branch, crosses the grand ridge twice. The populous and remarkable town of *Birmingham* is situate on high ground, near to the grand ridge, and has six canals branching off in different directions, either immediately therefrom or at no great distance, and what is singular, owing to a loop, or sudden bend of the ridge at this place, no less than five of them traverse the grand ridge, either by means of tunnels or deep-cutting.

When we propose to lay before our readers a more full and methodical account than has been given of the British canals, on which large sums of money have been expended by individuals, and from which important and lasting benefits have been derived by the inhabitants in their immediate vicinity and by the kingdom at large; it is needless to state any formal arguments, in answer to the mistaken objections, which were 40 years ago commonly circulated, whenever a new canal was in contemplation; such as their wasting of land, producing noxious and humid vapours, destroying the breed of our draught horses, lessening the coasting trade and the nursery of seamen, injuring old mines and established works by enabling new ones to be opened, introducing pilfering workmen and boatmen into the country, &c. &c. To the more serious objections, arising from the cutting of estates and fields in two; the taking of water from mills, &c.; interfering with former navigations by canals or rivers, and even with roads, on which, in some instances, large sums have been expended, and remain not reimbursed; to these and many others, we shall have the best opportunity of replying, when we come to mention the equitable provisions which individuals have proposed, and the legislature have in so many instances enforced, for securing to every one an adequate compensation for what he is called upon to give up.

General arguments in favour of canals are superseded by the rapidly improving and thriving state of the several cities, towns, and villages, and of the agriculture also near to most of the canals of the kingdom, the immense number of mines of coal, iron, limestone, &c. and great works of every kind to which they have been conducted, and to which a large portion of them owe their rise, are their best recommendation.

Justice requires our acknowledging the assistance we have received in compiling this account, from the *General History of Inland Navigation* by *John Phillips*, from the three numbers

numbers which are published of *John Cary's Navigable Canals of Great Britain*, from *C. Smith's*, *George Allen's*, and *Laurie and Whittle's* maps of the canals, &c.; from *J. Cary's* large map of *England, Wales, and part of Scotland*; from *Robert Fulton's Treatise on Canal Navigation*, from *William Chapman's Observations on Canal Navigation*, from *Joseph Plymley's Agricultural Report of Shropshire*, from *Zach. Allnutt's Considerations on the Navigation of the Thames*; from *Thomas Badcliffe's*, and from *Netbl. Kinderley's Accounts of the Navigation of Lynn and Wisbech*, &c. from the *Agricultural and Monthly Magazines*, from *Dr. Anderson's Recreations*, from the *Annual Register*, from *Thomas Telford's Reports on the Caledonian Canal*, &c.; and from the writings of others, to whom we particularly refer.

To *Mr. William Smith*, engineer, of Buckingham-street, London, we are indebted for many valuable hints and information given on many points, as we are also to *Mr. Benjamin Bevan*, engineer, of Leighton Buzard, Beds.

When it is proposed to form any canal, the choice of a skilful and experienced engineer is an object of primary consideration. Without due attention to this object, many impracticable projects may be adopted, and large sums of money may be expended without accomplishing any important and useful purpose. In suggesting the principal qualifications that are necessary for rendering persons competent to be consulted or employed in undertakings of this kind, we shall merely specify some of those that have in an eminent degree distinguished, or that still no less conspicuously distinguish several of our own countrymen. A skilful engineer should undoubtedly possess a considerable degree of mathematical knowledge. Calculations, of which some are of the most abstruse and laborious kind, will frequently occur; and he should, therefore, be well acquainted with the principles on which all calculations are founded, and by which they are to be rightly applied in practice. An engineer should also have studied the elements of most or all of the sciences, immediately connected with his profession; and he should particularly excel in an acquaintance with the various branches of mechanics, both theoretical and practical. His knowledge should comprehend whatever has been written or done by other engineers, and he should have information in every department of his office from an accurate examination of the most considerable works that have been executed in all the various circumstances that are likely to occur. It is necessary, that he should be a ready and correct, if not a finished, draughtsman. He should also be conversant with the general principles of trade and commerce; with the various operations and improvements in agriculture; with the interests and connection of the different owners and occupiers of land, houses, mills, &c.; and with all the general laws and decisions of courts, pertaining to the objects connected with his profession. By an extensive acquaintance with the disposition, inclination, and thickness of the various strata of matter, which compose the soil or land of the British islands, he will be able to avoid many errors incident to those who are destitute of this knowledge, and to have the course and causes of springs, to which it leads. As the last, though not the least, of these qualifications of an engineer, which we shall enumerate, we shall add, that he should be a man of strict integrity. If, at this day, the affairs of any canal company should be entrusted to persons deficient in all or the greater part of the qualifications above enumerated, the managers of such a company will thus incur a serious responsibility to the proprietors and to the public. In this connection we think it right to mention an institution that had its rise in the year 1771, viz. "the Society of Civil Engineers," as admirably calculated to ex-

tend the influence of our present and more experienced engineers, and to bring forward to public notice others, who, in the course of events, are destined to second them. For further particulars relating to this society, we refer to the preface of the first volume of *Smeaton's Reports*, *Nicholson's Journal* 4to. vol. ii. and the article *SOCIETY of Civil Engineers*.

A proper engineer being fixed upon, the adventurers should not tie him down too closely, by restrictions as to time, but allow him leisure to consider, digest, and revise again and again, the different projects and ways, which will naturally in most instances present themselves to him in an extensive and thorough investigation. The engineer should be allowed to chuse and employ the most competent assistants, and to call in and occasionally to consult the opinions of eminent or practical men, as land-surveyors, agents of the neighbouring landed property, the principal and most expert commercial men of the district, and who are best acquainted with its trade and wants, any eminent miners, &c. &c.; and such men the engineer should be authorized liberally, and at once to remunerate for their services and intelligence.

Previous to the beginning of any minute survey or system of levelling, the engineer ought to visit personally, and endeavour to make a just estimate, and preserve memorandums of all the objects within the district under consideration; as of the trade and importance of all the towns likely to be affected by the undertaking, of all mines of coal, iron, &c. quarries of lime-stone, free-stone, slate, &c. or the situation where such can be found, of all manufactories of heavy and cumbrous goods, and other extensive works; and generally of every thing likely to furnish tonnage for a canal. By this time, if the district under consideration be of very considerable length, more than one, and perhaps several, different routes for the proposed canal have presented themselves: and it will be proper, while the engineer's assistants are carrying levels (using good spirit levels with telescopic sights) along each, and making rough sections of the ground, or brook or river along each line, himself to visit and pass along each of these, noting and weighing more particularly the principal difficulties which present themselves in each route, as summits or hills to be passed, or tunnelled through, valleys to be embanked across, with aqueducts over rivers or brooks, the greater or less plentiful supply of water, particularly at the summit levels, and how far the springs and streams of water are at present appropriated or essential to mills or gentlemen's pleasurable purposes, or to irrigation, or the land occupied by parks, turnpike roads, &c. The advantages of each route should also be as carefully noted; as the shortness of distance, connection with great towns, mines and works either on the line or by short and practicable side cuts or branches, the smallest number of locks, bridges, culverts, &c. In weighing all these circumstances, in order to determine on the most advisable line, it should never be lost sight of, that a canal is altogether a mercantile speculation, and cheapness of conveyance is the grand desideratum thereof: where, therefore, but few, if any, great towns, works, or mines are found upon a proposed line, and the principal object is to form a connection between the canals of a district more fortunately circumstanced in these respects, and the metropolis, or a great town, as in the case of the *Grand Junction* canal lately completed, it is evident, that much ought to be done to obtain the shortest route that is practicable: if, on the contrary, the district under consideration has great towns, mines of coal, or great works distributed about it, some miles in the total distance may be properly allowed, and a more circuitous route adopted, to embrace

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embrace as many as possible of these objects, particularly coal-works; for it has been remarked, that the carriage of coals gives rise to the principal revenues of most canals; and some have even contended, that no canal can answer to the proprietors unless the carriage of coals be its principal object: there are, doubtless, some exceptions to this rule. It may be concluded, upon the whole, that no canal can be completed and brought into use, but the inhabitants and the agriculture of the district will shortly feel great benefit from it, whatever may be the result to the proprietors; yet in the stage of the business of which we are treating, it is the peculiar duty of the engineer to study the interest, and bring forward the probable advantages of the proprietors, fairly and without exaggeration, in order that the subscription may fill, and the work be enabled to proceed. Before determining upon the route of a canal, its connection with the neighbouring canals or river-navigations should be well considered, and the engineer should inform himself accurately of the quantum of benefit or injury likely to result to each of such existing navigations by the effecting of the new one, or how far their rivalry, or that of any other scheme which may at the time be in agitation, is likely to effect the one he is employed upon; in all the practicable routes, which present themselves for the new canal.

The most eligible route for the canal being settled in the engineer's mind, he will then proceed to make a rough calculation of the quantity of goods of each different kind, which may be expected to pass upon the line in a given time; he will also examine all the canals and rivers which the proposed canal is to connect with, and ascertain the widths and depths thereof, the sizes of their locks, and of the vessels usually navigating them. The engineer will now be able, well considering the nature of the ground the canal is to pass over, to determine on the most proper dimensions for the intended canal, and whether the probable supply of water renders it practicable to effect the rises and falls by the ordinary mode of locks; or whether inclined planes, or any other of the expedients which we shall more particularly enumerate hereafter, should be adopted: or even, whether a rail-way, in whole or in part, may not be preferable to a canal. The mind of the engineer will properly be exercised upon these questions; before a more minute and expensive survey and planning of any particular line are entered upon; because, the line, though passing through the same tract of country, will generally require to be conducted in a very different place for great lengths together, according to the size of the proposed canal; and inclined planes, or a rail-way in whole or in part, will introduce a still greater diversity in the routes that ought, under the different circumstances, to be pursued.

Robert Fulton, in his 4to. *Treatise on Canal Navigation*, published at London in 1796; William Chapman, in his 4to. *Observations on the various Systems of Canal Navigation*, London, 1797; Thomas Telford, in J. Plymley's 8vo. *General View of the Agriculture of Shropshire*, London, 1803; Edmund Leach, Dr. James Anderson, and others in different works, have recommended and enforced, upon principles more or less general and true in their application, a variety of schemes and methods of conveyance, by small canals, inclined planes, rail-ways, &c. of which we shall take notice under their proper heads, and of which the engineer will of course avail himself, as far as they appear applicable; as well as of any other inventions, which his own ingenuity or that of others may supply. Long levels may, in some instances, be obtained, without inordinate expence; and will often prove of great utility, in the saving of the time and

trouble of passing locks in the neighbourhood of great towns, as in the cases of Coventry, which has the benefit of more than 73 miles of level navigation on the *Coventry, Ashby de la Zouch*, and *Oxford* canals; and of Manchester, which has 70 miles of level water by *Bridge-water's*, and *Mersey and Trent* canals, including 12 miles in the tunnel to the *duke of Bridge-water's* coal-works in Worsley Hill: Birmingham has 43 miles of still water, by means of the old *Birmingham*, the *Worcester and Birmingham*, the *Dudley* and the *Stratford* canals; and this upon so high a level, that the three last canals cross the grand ridge in that space: Lancaster and Preston have 42½ miles of level on the *Lancaster* canal; Wolverhampton enjoys the benefit of a level 40 miles in length, on the old *Birmingham*, and *Wyrley and Essington* canals; Liverpool has 28 miles of level on the *Leeds and Liverpool*, and *Blackburn*, 24 miles upon the same canal; Basingstoke has 22 miles upon the *Basingstoke* canal; Whitchurch 21 miles on the *Ellesmere*; Devizes 20 miles upon the *Kennet and Avon*; Bottesford 20 miles upon the *Grant-ham*; London enjoys the benefit of about 19 miles of level to Paddington, upon the *Grand Junction* canal; Glasgow 18 miles on the *Forth and Clyde*; Gloucester is to have 18 miles upon the *Gloucester and Berkeley*; Shrewsbury has 15½ miles on the *Ellesmere*; Stainsforth 15 miles on the *Stainforth and Keadby*; Abergavenny 14 miles on the *Brecknock and Abergavenny*; Market Harborough 13½ miles on the *Leicestershire and Northamptonshire Union*; Shrewsbury 11½ miles on the *Shrewsbury*; and Cromford 11 miles of level on the *Cromford* canal. Another benefit will sometimes occur from long levels, by the bringing of all, or of a considerable number of the locks near together, as at Runcorn on *Bridge-water's* canal, by which they are more effectually looked after and kept in repair. Should it be necessary to return the water let down by the lockage, again into the higher pound by the power of engines, as is done on the old *Birmingham*, the *Barnsley*, and many other canals, the having of considerable falls in one place will be of material consequence; but still more so if inclined planes are to be used instead of locks, as on the *Shropshire*, *Shrewsbury*, and *Ketley* canals. In conducting the line of a canal, it will always be advisable, if other circumstances will permit, to bring two or more locks near together, and to erect a lock-house for the residence of a careful and proper person upon the spot, to look after and assist the bargemen in working the locks; where this had not been attended to upon some canals, but single locks were placed at great distances from each other, the company have, from experience of the damage such locks sustain, found it necessary to employ great numbers of lock-keepers, and often to build houses for the superintendence of single locks. Mr. Chapman, who appears to have well weighed the question, whether large or small canals ought to be adopted under different circumstances, observes, "that the system of small canals is particularly eligible in all countries where lime-stone, coal, iron-ore, lead, and other ponderous articles, not liable to damage from being wet, or likely to be stolen, are the objects chiefly to be attended to; and where the declivity of the country runs transversely to the course of the canal, which will generally be the case along the sides of mountains, at an elevation above the irregular ground at their feet. In those situations, the great falls or inclined planes may be made at the forks of rivers, so that the upper levels may branch up both the vales, and thus give the most extended communication. A situation suited for those canals will often be found in countries that are not absolutely mountainous, but where the ground regularly declines towards the vales of large rivers." The principles for which Mr. Leach has so strenuously contended, of re-

versing the usual order of beginning navigations at the lowest points or the sea, and extending them up the vallies towards the summits, and, instead thereof, beginning near the summit or source of the water, and continuing the level till the greatest practicable falls are obtained for inclined planes, would, unless the most enormous expences were incurred for tunnels, deep-cutting, and embankments, prove too crooked and circuitous for a ready conveyance, as happened on the *Bude and Launceston* canal, which was proposed to pursue a serpentine course of 81 miles, between two places whose direct distance is no more than 28 miles! The long level of the *Oxford* canal, at its northern end, of which we have spoken above, appears among the most crooked of those canals which have been executed, and is particularly ill adapted, to the great thoroughfare or communication which it forms with other canals. Canals which are to form an immediate connection between the sea or tide-way at different places, as the *Inverness and Fort William*, *Crinan*, *Forth and Clyde*, the *Isle of Dogs*, and the *Gloucester and Berkeley*, must be of large dimensions, or the principal advantages of such a communication would be unattainable; in like manner, the communications between the sea, and docks or harbours, will some of them require to be of still larger dimensions, as the *Grimsby*, *Ulverston*, *Dee* new channel, &c. A system compounded of *water-levels*, or lengths of canal on different levels without communication by locks, may sometimes be found advisable, as on the *Shropshire*, *Shrewsbury*, *Ketley*, *Leicester*, &c. The advantages of being able to conduct a canal, in many instances, upon water-tight strata, instead of rocky or porous soils, and perhaps without losing sight of any of the other important considerations mentioned, are sufficiently great to induce engineers to become acquainted with the arrangement and particulars of the *strata* within their district, by a minute and careful examination, or to call in the assistance of those best informed on such points. We have purposely omitted, till now, to mention the consideration of the value or quality of land to be purchased for the use of the proposed canal by different routes; convinced that some late canals have been materially injured by the narrowmindedness of those who would avail themselves of cutting through common or low-priced land: even the general consideration of expence, in the works of a proposed canal, should hold but a subordinate place in the mind of an engineer in the present stage of the business, because contracted views in this respect may frustrate the attainment of a great portion of the benefits to be expected; and it cannot be doubted that any scheme of conveyance will best answer to the adventurers and the public, when conducted upon the principles most adapted to the case, let the expence be what it may; and fortunately, the commercial and public spirit, aided by the means of individuals collectively in this country, has long shewn itself equal to any enterprise however bold, where advantages can be shewn materially to preponderate.

In the particular survey of the line proposed, all the knowledge of the most expert and competent engineers, with the most able assistants, will be requisite. The rough section of the proposed line, before taken, will enable the engineer to see the places of the heights and breadths of the various summits, or ranges of high land that are to be passed, and whether any two or more adjacent ones can be connected by a long summit level, without deserting any considerable town or point of trade, which will diminish the difficulties of supplying the canal with water, as every such junction of summits preserves the water of two lockages, besides presenting so many more points at which the canal can be supplied with water, from springs and rivulets above its level, or where, in less favour-

able situations, the same can be collected in a lower level to be pumped up. The extremities of the principal summit or summits being thus nearly settled, it will next be inquired, how far it is practicable and advisable to reduce the height of the same by deep-cutting or by tunnelling, or both of them. The advisable height of the summit-level of the canal being settled, if water is not in sufficient plenty, a minute survey of both sides of the range, or ridge which is to be passed, and of all its connecting heights, for a considerable distance on each side of the line, should be made by tracing the proposed summit-level along all the sides of the hills, particularly noting all the springs or rivulets which rise above and cross this line; and all such streams of water should be accurately gauged, and the quantity of water which they discharge per day determined; the same should also be done for all the rivulets or small streams that cross the line of the canal throughout its course; and these experiments should be made not only where the streams cross the line, or levels, but at a considerable distance above and also below those points, the particulars of which experiments should be regularly and formally entered in a book, with all the attendant circumstances, and signed by the parties present at the making of them; as the same may prove of the most important use in future, either for detecting any secret leaks in the canal, or feeders by which any of these streams may be increased; or, in case of future claims being made for the water, or the diminution thereof by mill-owners or others, the company may be prepared, either to make a just retribution, or to resist ill-founded or ignorant claims with effect. For calculating the quantity of water discharged through gauges or apertures of different kinds and dimensions, theorems should be used which make the necessary allowance (deduced from experiment) for the form of the channels or apertures; such will be found in Dr. Young's abstract of M. Eytelwein's learned German work on Hydraulics, printed in the Journals of the Royal Institution, as also in Nicholson's *Journal*, 8vo. iii. 25. The survey of the summit of which we were speaking, ought to be accompanied by a plan, on which should be laid down the exact course of every valley and range of hill above the level of the proposed summit, with every particular of the nature of the soil in each; that in case reservoirs therein should be found necessary to collect rain or spring water, the necessary extent and probable supply of such can readily be determined at a subsequent period. From one end of the proposed summit-level it will be right now to proceed with the survey, tracing the level accurately and marking the same by pegs or stakes, that will last for some time, and be known by the surveyor, who is to follow and make a plan of the line; the levels being frequently transferred to what are called bench-marks, upon the trunk of a tree, a large post, or a building, the same being noted so particularly in the field or survey-book, that they may be readily found for years afterwards. We suppose the engineers, by this time, to have settled the rise that each lock should have, according to the dimensions adopted for the canal, the probable supply of water on the summit, and other circumstances; the summit-level will be traced as above, till the proper place occurs for making a fall of two or more locks, at about 100 yards or a little more from each other; and the places of these falls being marked, the level is again to be pursued and traced from the bottom of them, and marked out as before, till the opportunity occurs for another pair or more of locks, or till some obstacle, as a gentleman's park, houses, gardens, orchards, mills, roads, &c. present themselves at a distance; when it will be proper, after referring the level arrived at, to a proper and permanent mark, to proceed forwards,

forwards, and to examine and well consider the different ways and levels, if more than one of such present themselves, by which the obstacle can be passed. From the most confined part of the course for the canal, owing to the obstacle, it will be right to level back, till the former work is met, and, in many instances, considerably overlapped, in order to determine the most eligible mode of bringing the two levels together, upon the principles before stated, if they can be applied, either by adding another lock, or taking one from any of the sets of them which had been before marked out, as occasion may require, and marking out the new levels thereby occasioned: the line between the summit and the first obstacle, or confined part of the course, being thus adjusted, a new point of departure is to be taken from such obstacle, and the level pursued as before, till the fall for a pair or more of locks can be gained, at the proper distance from each other. It is probable, that but few sets of locks can thus be determined upon before some new, and perhaps more formidable obstacle will present itself, which it will be necessary to break off for, and proceed forwards to consider, and to obviate as before; or the new difficulty may consist of some considerable lateral valley coming into the one which we are supposed to be pursuing, which may occasion an insurmountable or unadvisable length of embankment and aqueducts necessary, in order to pass it; or some gentleman's seat, mill, or town, may be found so completely occupying that side of the valley down which the line was proceeding; that the engineer may find it necessary to go back and revise a great deal of what he had done, perhaps quite up to the summit, and perhaps to take a new course down the other, or opposite side of the valley, or at least to determine where, with the least expence of embankment and aqueducts, the valley can be crossed to gain the opposite side. The places of the different sets of locks, or of single ones, if they cannot be avoided, and the line between each being adjusted anew, we will suppose the work again to proceed, till some new obstacle presents itself; this may be either a total change in the course of the valley that the line was pursuing, so as to render it necessary to begin to mount some other valley towards a new summit; or some gentleman's park, who is adverse to the measure, may so completely occupy the valley, down which the engineer is intent still upon pursuing his course, that it may be necessary to search out for the most eligible place for tunnelling through the hill into some adjacent valley, which is about to fall into the main valley. An instance of this latter kind occurred at King's Langley upon the *Grand Junction* canal, where the first Act provided for a tunnel of near half a mile in length, in order to avoid Cashiobury park: but the same has since been altered, and the course of the canal continued through this and some other parks, contributing not less to them in point of ornament than to the public in utility. It may happen, in case of a change of the direction of the valley, rendering it necessary to leave it, that some other valley may be at no great distance, into which the canal must be conveyed by a tunnel; and in order to render this practicable, it may be necessary to go back, and conduct a good deal of the line that had been done upon a new and much higher level, by omitting some of the locks, in order that the level may be conducted through, and supply the proposed tunnel: in accomplishing this, the former obstacles may recur again, or new and more formidable ones may be presented. In this way, the patience, perseverance, and abilities of the engineer must be exercised, until a practicable line of some length is obtained, and staked out; when the assistant land surveyor must follow, and make a correct and particular plan of the line of the

several proposed locks, embankments, tunnels, &c. upon the same, and of the several fields or pieces of land through which it passes, or that come within 100 or 150 yards of it in any part: it will likewise be the business of the surveyor to ascertain, with the utmost care, the boundary of every parish and township, what county each is in, the proper names of the owners and occupiers of every piece of land in each, however small, upon or within that distance of the line, with reference to the same upon his plan; and to describe correctly all public and private roads and paths that cross or intersect the line, and to and from what places they lead; the course of all brooks or streams of water, and particularly such as lead to, and contribute to the supply of any mill: the situation of the houses and towns upon the line, or within some miles of it, should also be determined; the nearer they are the greater accuracy will be necessary. We will now suppose the engineer proceeding with the line, from the end of a tunnel into a new valley, the course of which downwards is in the proper direction; the same process is to be repeated as was pursued in descending from the first summit, until this new valley changes its direction, or until some great town or work has been reached, and it becomes necessary to change the course of the canal, and begin to ascend some new valley or plain towards a new summit, or towards some mine or work, at which the canal is to terminate: to the new summit it will be necessary to proceed, and after settling the height of the summit-level, and taking all the preparatory steps for ascertaining the supply of water, and other circumstances of this summit, as described respecting the first, the levels will be traced from this summit downwards, working backwards or up again, as often as obstacles may render it necessary, until the former work in the valley is met, and a proper junction of them contrived: the whole of this part being adjusted, the surveyor may proceed as before, with his plan and particulars: while we suppose the engineer returned to the first summit, and from which he will conduct his line, and avoid the obstacles thereon, in the best way that his ingenuity can suggest, until he arrives at the navigation or sea-port, at which his canal is to terminate, and where basons or docks, more or less capacious, according to the expected trade, and wharfs, cranes, and other conveniences, may want planning, for the accommodation of the traders and the public: all which the surveyor will proceed to survey and plan, as before mentioned. It may be necessary to remark, that every town, mine, or work, which happens to lie higher than the line, and to which a collateral cut is to be carried, must be considered as a separate summit, and provision for supplying the lockage thereof must be made, and such of the examination before described gone into, as may appear necessary; such towns, &c. as lie below the line, and are to have cuts or branches to them, will require water to be let down out of the line to supply their lockage; on which accounts, it is highly desirable, whenever the same is practicable, to conduct the line upon such a level, that the collateral cuts may be upon the same level, by which the trade thereon is much facilitated, and less water required.

A complete plan of the line, and all the projected collateral cuts, feeders, reservoirs, &c. being finished, the engineer will enter on a most careful revival of the whole scheme, with this plan in his hand; on which all the places where culverts or drains will be required, are to be marked, as also the proper places for the bridges, and the necessary alterations of the roads and paths, which will be cut off by the canal, so that the public may not be inconvenienced and turned long distances round about, and still, that as few

bridges as possible, and those in the least expensive places, may be erected. In some instances new channels will require to be cut for brooks and water-courses, to a considerable extent, in order to save culverts, or bring them to the most desirable spots. For proper security against accidental errors, the whole of the levelling should now be gone over again, and the several bench-marks compared, and renewed with the utmost care by the engineer's assistants, while he is proceeding with the necessary inquiries and calculations, for an estimate of the whole expence of the undertaking.

In a great number of instances it will be found, that the supplying of a canal with water, occasions no inconsiderable share of the whole expence, either in the first cost of mills or streams of water, in land for, and labour in, constructing reservoirs, engines to pump up water, &c.; or annually ever afterwards, in the fuel for, and repairing of, engines, hire of water from mills in dry seasons, &c.; this subject should, therefore, employ the most sedulous attention of the engineer, both to make the most economical use of what streams he finds, to procure other supplies of water at the least expence, but above all, to secure an abundant sufficiency. The dimensions and height of the locks, and breadth of the canal being settled, an accurate calculation made of the quantity of water required to fill a lock; and, with the largest probable number of boats that will pass in a day, the quantity required daily in every part of the canal; this, with a due allowance for the evaporation, from the surface of the whole canal and its reservoirs, and for the soakage that will take place into the banks, however well they are constructed; will show the number of locks full of water that will be required, from all the different sources. We have spoken of the steps proper to be taken for ascertaining the whole supply that can be had above the summit's level; and it will often be necessary to make a similar investigation, on points below that level, and to construct reservoirs in such situations, to supply the necessary lockage, for local trade upon the line, near any great town or works, which does not extend to the summit, as also to supply the evaporation and soakage of long lengths, in situations where feeders or springs cannot be taken in by the way; another use of reservoirs in less elevated situations may be, to compensate mills that are lower down the streams for the water that is taken for the use of the canal from the higher branches, or near the sources of such streams. For Mr. *William Jessop's* observations on this subject we refer to *William Pitt's General View of the Agriculture of Staffordshire*, and to the *Repertory*, vol. iii. p. 243.

There appears no reason, under the present state of things, why the owner of a mill or stream of water should not be compellable to part with the same, for the purposes of a public canal, any more than another man to part with his field, except the accommodation which the public receive from such mill; and where the same, or a superior accommodation, can be ensured to the public, surely this species of property ought to be put upon the same footing with land in general. See Dr. *James Anderson's* Essays, vol. iii. p. 68 to 76.

It ought to be considered, that the present state of our canals and inland navigations, and especially the extension of them, which we are now supposing, remove one of the principal objections to steam engines, by enabling new mines of coals to be daily opened, and the products thereof, as well as of the old mines, to be regularly and cheaply conveyed to every situation where engines can be wanted. We would not, however, be supposed to recommend the annihilation of water-mills; on the contrary, it hath long appeared

to us, that their number and their power might, in some, and perhaps in most instances, be greatly increased, and yet all the purposes of canals be fully answered, and those most capital improvements of irrigation and drainage at the same time extended, to very large tracts of land; for this purpose it would be necessary, that an entire valley of considerable extent, that has a good stream of water through it, as the *Colne*, or the *Lea* near London, for instance, should be put under a system of improvement. A thoroughly competent engineer being employed upon such a work, would be able to conduct a canal rather of large dimensions perhaps, along one side of the valley downwards, until three or four locks, or a fall of 20 to 30 feet was obtained; and, the water in the pound below such set of locks to be a small distance below the level of the surface of the ground, in the lowest part of the valley at that place, as this would enable the whole stream of the river to be taken into the next length of level, as often as occasion should require it: this new level would be traced, until, by the fall of the valley, it has reached the sides of the hills, and proceeded with until another set of locks, three or four in number, can be obtained, and a descent made again to the level of the lowest point of the valley: this process to be continued through the whole length of the valley, under improvement. The next consideration would be, a deep and effectual drain, to be carried up through the whole length of the valley, pursuing the lowest ground, and the middle of the valley nearly, in such parts where the hills on each side rise equally abrupt; but where, as often happens, the descent to the valley on one side is very sudden and steep, and on the other side long and gradual; in all such cases the drain should be conducted nearer to the abrupt than to the easy side of the vale, because here the peat or alluvial matters, with which such valleys are choaked up, will be found the deepest, and the springs in the gravel underneath such peat, the most copious and the most confined; the new drain ought, in general, to reach the gravel under the peat or filth; and where this shall be found impracticable, large auger holes ought to be bored at short distances from each other, quite through the consolidated peat and filth, to the gravel, to set the confined springs therein at liberty. These principles of draining a boggy valley we have seen successfully practised in the village of *Crawley*, below *Woburn* in *Bedfordshire*, by an agent of the late worthy *duke of Bedford*.

If the fall in the new drain should be found very considerable, the same must be reduced, by placing weirs or well-falls at proper places, to let the stream down in an harmless manner, which would otherwise displace the gravel and sand under the peat, and the same would cave in, so as to fill up and destroy the drain: another excellent use of these well-falls or weirs will be, to furnish so many points, where the whole stream, including the springs, can be taken out to supply the upper end of the levels of the canal before mentioned, or for the purposes of irrigation; as was intended and provided for, in the *Crawley* vale that we have been speaking of. To all the existing mills, which are not too ruinous or badly constructed to be worth improving, the channels to the water-wheels should be deepened up from the main drain, or, perhaps, in most instances, new and more direct ones cut. It will now be practicable for the engineer, in most if not in all cases, to construct an *over-shot* water-wheel upon the same axis that before carried an *under-shot* one, turning the same way and with the same velocity as before, so that the internal machinery of the mill will need no alteration; and the requisite quantity of water for working these new wheels, which in most cases will be inconsiderable, may be conveyed from the canal on the side of the adjoining hill, in

aqueducts or elevated troughs of no very expensive construction, perhaps of cast iron, or in pipes, which may be conducted under ground, and rise up to small reservoirs or pen-troughs above the wheels. As many of the mills will be found situated on the opposite side of the vale from the canal, it may be proper and advisable in most cases, to construct a cut or water-carriage of sufficient dimensions, and with a very slight fall, along that other side of the vale, beginning frequently at the weirs or well falls in the main drain or new brook, and pursuing the level nearly, as far as is found requisite; which cuts will much extend the benefits of irrigation, and give opportunities, perhaps, of constructing new mills, with over-shot wheels of large diameters and proportionate power, to be supplied therefrom. In like manner, several new and powerful over-shot mills may perhaps be constructed near to the several sets of locks upon the canal, without endangering the sufficiency of water for the lockage: this practice of uniting navigation and mill improvements at the same time, we were much pleased to see enforced by Mr. *Thomas Telford*, in his Report of 1801, printed by order of parliament, upon the intended *Inverness and Fort-William* canal, p. 46: and the same has been suggested as an appendage to the Woolverton embankment on the *Grand Junction* canal; see the *Agricultural Magazine*, vol. viii. p. 24. New and improved mills may often be constructed where the point of a hill at a great and sudden bend of the river can be tunnelled through, from the river on the upper side, as appears to have been done at Shrewsbury on the *Severn*, and at Stanley on the *Tay* rivers.

Where the new drain or brook course connects with the levels of the canal in the improvement of a valley, as above proposed, if floods are to be apprehended, or the water is ever found very thick and muddy, weirs or over-falls sufficiently large to let the flood escape down the drain must be constructed, and stop-planks provided to be put down across the canal occasionally, or a lock capable of a very small fall constructed, to be occasionally used, to prevent very muddy waters from entering the canal to silt it up. It will frequently happen, that brooks which are making their way laterally into a valley under improvement, may by an alteration of their channel for some distance up the collateral valley, be brought into the canal in places where a considerable elevation on the side of the hill has been attained, in such cases a circular weir or well-fall should be constructed in the centre of an enlarged part of the brook, before it arrives at the canal, as has been done by Mr. *James Brindley*, at the mouth of Medlock brook at Manchester, on *Bridgewater's* canal; a provision for stop-planks, at the junction with the canal, will also be proper, to be enabled to turn occasional muddy water down the well-fall instead of into the canal. In order to preserve a sufficient elevation in the water-course, for supplying of mills, or for irrigation, after the canal has descended a set of locks, and is consequently too low for this purpose, a cut or water-carriage may be taken out of the summit's level, and carried on along the side of the hill with a proper fall, as far as may be necessary. This system of improvement in a valley, is capable of being combined with an extensive application of reservoirs, for equalizing the head and collateral streams which supply such valley, as recommended by Mr. *W. Jessop*.

In cases where the land or park owners cannot be brought to concur in a general system of improving a valley, it would often be worth while for a canal company to obtain power from the legislature to purchase all or most of the mills in a valley, through which their canal is to pass, paying, in the first instance, the utmost value for them; and being also bound to erect the same number of mills, of equal or su-

perior power, and adapted to the same purposes, to be supplied from higher levels in the manner we have been describing; such new mills to be offered at a fair price, to be settled by indifferent persons, to the owners of the adjoining old mills, before the same are disturbed in the use of the old mills; and in case of their refusal to purchase, the same to be next offered to the persons who may be tenants to the old mills (in order that they may not be thrown out of employ); and then to any other persons inclined to become purchasers, on such terms as they and the canal company could agree upon.

Sometimes it may be practicable to make a bargain for taking weekly into the canal, a stream of water which supplies a mill, only from Saturday night to Sunday night, paying a fixed rent for the same, to be secured by the act; an instance of which occurs upon the *Montgomery* canal.

The subject of supplying water for a canal having been amply illustrated, we shall now return to the revival of the survey, and making an estimate of the expence of the undertaking, on which we supposed our engineer to be employed. In revising the survey of the line, it may be proper for the engineer to cause holes to be dug at certain distances, as deep as the canal will require to be cut, or deeper, to inform himself more perfectly of the soil to be cut in, and the expence attending the same, noting particularly the height to which springs may rise in the several holes. And here it may be proper to notice a very common error, into which the persons entrusted to execute canals have fallen, in such parts where springs appeared beneath the surface in the cutting, by concluding that the canal would make water, as they term it, in such parts, and that puddling was unnecessary; but where too often it has afterwards happened, that such springs, from having a variety of other vents or outlets, at or very near to the same level, and were, therefore, incapable of being dammed or raised much higher than they then appeared; when the canal has come to be filled with water to a higher level, the course of such springs has been reversed, and the porous strata through which they passed have served to absorb and discharge the water at other places, to a very fatal extent. Land-springs, or such as run only in winter, have generally the same effect, and in summer as copiously take in water, when their own source fails, as they before discharged it. The difficulty of puddling or lining out springs, on account of the powerful effort they make to force their way through the lining, as long as the canal remains empty at first of water, will induce a careful engineer, to endeavour to avoid, if practicable, all springs that will not at all times rise to a higher level than the water is to stand in his canal. It will be part of the business of this revival of the line, to examine what can be done to straighten the canal, we mean as to sudden bends, by small lengths of deep-cutting, and others of embankment, to correct the plan accordingly, and to estimate the extra expence of all such works. The lengths and solid contents of the several embankments, and the distance from which the stuff or soil must be fetched for the same; the lengths and dimensions of all the deep-cuttings, and the distance to which the stuff must be removed; the lengths of the tunnels, and number and depths of the several shafts or tunnel-pits that will be necessary; the lengths of headings or soughs that will be wanted to drain the tunnelling works; these, and all the great variety of other works, some of which we have already mentioned, and others that we shall have occasion to mention in the sequel, being particularly stated, and prices affixed to each species of work and kind of material; and these prices ought by no means to be below the current prices of the best articles of the kind at the time, but due allowance should

should also be made for the advance of prices, which will take place during the execution of the work. The total probable expence, with a due allowance for contingencies, being thus obtained, the engineer will prepare his general report and estimate, to be laid, with the plan, before a meeting of the adventurers or proposed proprietors.

The next step in the progress of this business, after the appointment of a solicitor of competent legal knowledge, is an application to parliament for an act, empowering the parties concerned to complete their undertaking.

From the earliest times, the parliaments of this country have found it necessary to adopt certain standing-orders, or general rules, to be observed by the parties who applied for any act of a local or private nature; and these seem to have guided the conduct of canal projectors, till the number and variety of such applications shewed the necessity of adopting, on the 7th of May 1794, thirteen special resolutions, as standing orders, relating to the introduction and passing through the house of commons, of any acts for navigable canals, or aqueducts, or for the navigation of rivers; to these another was added on the 16th June 1795, respecting intended reservoirs and feeders to a canal or navigation; and another on the 25th June 1799, applying the former orders to rail-ways or drain-roads, as far as the same are applicable. The house of lords have a nearly similar set of standing orders, and one requiring a sufficient number of copies of an engraved map of the intended canal, &c. to be delivered for the use of each member of that house.

The number of clauses, relating to the construction and management of a canal, are necessarily very numerous, and it were much to be wished, that the proposition of Mr. *John Clennel*, in several periodical works, for a general canal act, to contain all their general clauses and provisions, in the same way as the general highway and turnpike acts, and the general inclosure act, could be accomplished; it would much shorten and simplify the business of canal acts and management. Another general measure, relating to canals, we beg here to mention, although the application to parliament in the session just now passed (1805) did not prove successful, we mean the proposal for a *general canal company*, for raising a large fund, to be invested in shares of canals not yet finished, and for lending money at interest, to such canal companies as may require it, to enable them to complete and render their several concerns more generally beneficial.

Mr. *William Chapman*, when speaking of the navigations of America, says, (Observations, p. 64.) "It will be advisable in a rising country, to lay out the lines of canals approximately on its first settlement; reserving a proper width for them, in the original grant of the lands, with power to exchange the land of that line, for any other found more convenient, on a full investigation; and thus avoid all the difficulties attendant on those measures in England." Does not the period of the inclosure of a parish here furnish the same opportunity of considering the eligible line for a canal; and of so contriving the allotments that very few, or perhaps only one person's land may require to be cut into, upon the adoption of such measures, and that without cutting up or deranging the system of his or their estate? We were happy to see this idea acted upon, as far as irrigation is concerned, in the parish of Maulden, in Houghton-Regis near Dunstable, (into which a cut from the *Grand Junction* canal was proposed to be brought,) and in some other parishes in Bedfordshire, about the year 1797, by the late duke of Bedford's agent.

One of the first objects of a canal act is, to incorporate and make a body politic of the proprietors, by a certain name and style, by which they shall have perpetual succession

and a common seal, and by which they may sue and be sued, and have power to purchase lands, to them, their *successors*, and assigns, for the use of the undertaking, without incurring the penalties and forfeitures of the statutes of mortmain; and to enable the company to sell any lands so purchased. The selection of the name for a canal, is of more consequence than would at first sight appear. Since canal and rail-way companies have multiplied so very much, it is necessary on all occasions to adhere to and use their incorporate or *parliamentary names*, a circumstance which has not been attended to sufficiently, but such a variety of names have been used, in the printed accounts of events upon or relating to our canals, that it is often impossible to avoid mistakes.

It has been usual to enable the company to raise a fixed sum of money, equal to or exceeding the total estimate of expences, by subscription or shares; and, in case of this proving inadequate, to borrow a further fixed sum upon interest, or on mortgage of the tolls. The many and expensive acts of parliament that canal companies have been obliged to obtain in the course of their work, for powers to raise further sums, and even for regulating and enforcing the mode of raising the sums first authorized, shew the necessity of the engineer and solicitor paying great attention to this point, and to be careful to apply for powers sufficiently ample.

The usual amount of shares in canal companies is 100l. but instances of 50l. shares, and others of less or greater value, occur in several of these establishments. These circumstances ought always to be particularly attended to in comparing or quoting the prices of shares in different concerns; and we strongly recommend all future shares to be 100l. ones, especially as the legislature will permit of half shares, or even lower divisions, down to the eighth of a share, as appears in the *Grand Junction* act, 43 Geo. III.

To prevent the interest of any individuals from preponderating, and to increase the number of persons having an interest in the success of the undertaking, it has been usual to limit the number of shares which any individual can hold, under forfeiture of all above that number, except they came to him or her by will, marriage, or other legal process.

The election of a committee of management, and all questions agitated in the company are decided by votes, not personally, but according to the number of shares held by each person, to a limited extent, and usually two half shares carry one vote. The usual limitation to prevent any individuals from possessing too great power in the company is, that no more than 15, or sometimes 20 votes shall be given by one person; while in the *Newcastle-under-Line* only 6 votes are allowed; and in the *Croydon*, *Peck forest*, and *Thames and Medway*, no more than 5 votes can be given by any one proprietor.

General meetings of all the proprietors are provided for, on any important occasion, as well as annually to elect the committee and officers.

Provision should be made for progressive calls on the proprietors, by the committee, for their several subscriptions; these should be on as long notice as is eligible; but they must be prompt and strictly enforced, or the progress of the works will suffer.

The enactments relating to purchasing of lands, and ascertaining the value thereof, where the parties and the company's servants do not agree, by means of the commissioners, will be necessary, who generally consist of all the considerable land-owners of the county, or of a jury to be impanelled for such purpose, these ought to be very clear and explicit: so should the regulations and forms for selling and transferring shares in the concern.

The most ample powers should be given to enter upon, and

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and dig, and construct, both the permanent and all temporary works which may be necessary; with provisions, in case of refusal, to accept the compensation offered for damage; that the commissioners or a jury shall settle the same without delay or further appeal, except, in some instances, to the next quarter-session of the county.

A clause is generally inserted, confining the company to the line that is laid down in the plans that have been deposited with the clerk of the peace and with the house of commons, or within certain limits on each side thereof; the usual deviation distance allowed is 100 yards; however, many instances have occurred, which shew how very important it is to the proprietors, that the line of the canal, and every probable cause for the necessity of deviation, should have been thoroughly examined and weighed by the engineer, and the line ultimately adjusted, before the plans are completed and delivered.

The prudent precaution of the legislature, has always limited the width of land which canal proprietors have been empowered to purchase for their canal, in ordinary cases, without the free consent of the owners; this has been 20 and 30 yards, in the greater number of instances, but in others the space allowed for the canal towing-path and fences has been less or greater, according to circumstances.

Where wharfs, docks, or basons, or places for barges to turn and pass each other, or where deep-cutting or embankments are required, it has been usual to allow 100 yards in width to be purchased; but from this allowance there have been occasional deviations.

Except in some rare and peculiar instances, like the *London Docks* in Wapping, the parliament will not give to any company the power of purchasing houses or other buildings, gardens, orchards, yards, parks, paddocks, or planted walks or avenues leading to any house, except the previous consent of the owners thereof be obtained; and where this has been got, it is the safest way to insert a list of all such owners, with a description of the property they have agreed to give up, as a schedule to the bill: and the same of all material contracts for mills, streams of water, or springs, which the company may have made. Houses built, or orchards, &c. made as obstructions, since the survey was made, and notices given, will not meet with the same protection; and a clause ought to be inserted to put them upon the same footing with lands in general.

Powers should be given for erecting public wharfs, and for demanding and enforcing certain equitable rates of wharfage for goods, according to the length of their continuance on the company's premises.

The toll, or rates of tonnage, which the traders are to pay to the company per ton per mile for the liberty of navigating upon the canal, or its various branches, rail-ways, or inclined planes, require the most deliberate consideration, that every species of trade may pay its proportion, and none be discouraged or lessened by the expences of conveyance.

In some cases provision has been made, that when the net profits of the concern exceed a certain rate per cent. the tonnage or tolls should be reduced.

There have been exemptions from tolls, on several canals, in favour of officers and soldiers on their march, with their horses, arms, and baggage. Timber for the use of his majesty's navy, and government stores of all kinds sometimes pass toll-free; so do gravel or other materials for the making or repair of roads in most instances. In some cases, canals have been projected principally with a view to tonnage on lime, and other manures and agricultural objects and produce; but with this exception, it has been usual to allow lime and all manures to pass, either on a very low tonnage, or absolutely

toll free, on the levels, and through the locks also on some, particularly when the water actually runs over, or is within a quarter or half an inch of the top of the lock-weirs; in some instances, several hours notice is required, of boats with manure or road-materials intending to pass any locks toll-free. In some instances, where a canal is to run parallel to a turnpike road, and is expected to lessen the tolls thereof, by the diminution of heavy waggons and carts, it has been usual to compensate or indemnify the creditors on such roads; and it seems equally just, where a turnpike road crosses a canal, and is likely to have its tolls both ways increased, that they should not be entitled to receive materials by the canal tonnage free.

Mile-stones are directed to be fixed on banks of most canals, for regulating the distances and tonnage; in several instances, these are directed to be placed every half mile, and in others one is to be placed at the end of every quarter of a mile.

We should far exceed our due limits, if we were minutely to recount the various expedients that have been adopted for conciliating the owners of lands, parks, mills, &c. who may more or less be affected by different canals. These must depend on a variety of local and incidental circumstances, for the adjustment of which no general rules can be prescribed. But in all cases of this kind the canal companies have usually proposed, and the legislature has sanctioned, an adequate compensation. Proprietors of land and their tenants are sometimes allowed the use of the towing-path, as a drift and bridle-way between their different lands, or to some public road; the owners of the adjoining lands are often allowed to make, not only docks and basons communicating with the canal, but collateral cuts of considerable extent, to their mines and other works; but previous notice of all such intentions ought to be given to the company, that their engineer may examine the ground, and direct the necessary puddling and other precautions, to secure the line of canal from losing water to a prejudicial extent thereby.

The company are often empowered, and sometimes required, to make collateral cuts, or rail-way branches to particular towns, mines, or works; and a very proper precaution seems to have been adopted in the *Somerset Coal* canal act, that the parties to be benefited by such branches should first give the company security to make up the tolls thereof, by an annual payment, in case of their falling short of a reasonable interest on the money expended upon such branches.

In some instances it may be necessary, particularly on rail-ways, to permit individuals to construct and manage such part of the works as pass through their own park or ground, but subject to the general system of management laid down in the act; as is done by the *duke of Beaufort* on the *Swansea* canal, and by *sir Charles Morgan* on the *Sirhowy* tram-road; also to construct particular parts, on being paid for the same, as was done by the *Dee* river company, at the crossing of the *Ellesmere* canal.

Clauses are generally inserted, requiring the canal company to remove and clamp the top soil, or vegetable mould, to the depth of nine inches, from the whole width of the intended works; which, after the same has been completed, and all the banks and excavations properly sloped down, is to be returned and spread upon them, so as to render all the land, not actually occupied by the canal and works, capable of cultivation; but a small part of this top soil is wanted in general upon the banks, and it might, more profitably for all parties, be filled by the company's men into the carts of the neighbouring farmers, to be spread upon the poorer parts of their lands.

Watering places for cattle are generally directed to be made, especially

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especially where the fields may have been deprived of their old ones by the cutting of their canal. In counties where irrigation is much practised, as in Wiltshire and some others, it has been common to appoint skilful and reputable persons to guard the interests of the irrigators, on the cutting of canals.

On the duke of *Bridgewater's* canal, irrigation trunks were laid below the bottom of the canal, so that, by means of a harrow, or rather a large hoe, drawn along, the mud of the canal was drawn to the valve or orifice of the trunk when open, and the mud was thus conveyed to the meadows below. A successful experiment was here also made, of bringing up barges laden with sea slush, or mud taken up at low water, in the Mersey, and this was gradually poured or thrown out into the canal, over the irrigation trunks while running, by which means this valuable manure was at once conveyed to and effectually spread on the meadows below. We have been greatly surprised to find irrigation so little practised upon the lands below canals, which so perfectly admit of that improvement; were this subject properly attended to, in situations where water is plenty, we doubt not but some proprietors or lessees of land would be found, who would readily contract with the engineer, on the part of the company, before the canal is completed, to pay an annual rent for certain quantities of water, to be let out by the company's agents, at stated times, through a trunk, which might be laid beneath, or level with the bottom of the canal for such purpose, at a very easy expence, before the water was let into the canal; and even after canals are completed, there are situations where the interest of all parties might be served, by laying trunks for irrigation; and perhaps farmers ought not, except in some few instances, to be debarred from constructing or using proper weirs at the same immovable height, or a little higher than those at the lock-gates, to take off the surplus water for irrigating during the winter season.

Sometimes it will happen that a canal can be conducted on a proper level to suit the adits to mines, as at *Worsley* on *Bridgewater's* canal, and some others; or perhaps the tunnel through a hill may be applicable to mining purposes also, as at *Morwelham* down, on the *Tavistock*, near *Ripley* on the *Cromford*, the *Harcastle* tunnel on the *Trent and Mersey*, and others.

Coal-mines may be allowed to have the necessary passages for their works under a canal, but should be restricted in the number, width, and height of these, as on the old *Birmingham* canal; or if the veins are near the surface, the ground may be so entirely broke in, that the canal would be destroyed, as has actually happened on some of the branches of the above-mentioned canal, near to *Wednesbury*.

Respecting mills, it may be necessary sometimes, where the canal is to be conducted near to established mills, that they should be secured against other mills in the same line of business being erected on the canal at that place, as in the *Sankey* canal act. Sometimes gauge-weirs, or self-regulating sluices, may be necessary to be maintained, to supply mills or other canals with a regular and constant quantity of water; instances of which occur on the *Rochdale* canal, and at the *Amsworth* reservoir, on the *Nottingham* canal; the theory of the regulating sluice, in the latter place, will be found in the *Gentleman's Diary*, 1799, p. 43. by that eminent mathematician and coal-worker, *Mr. Thomas Walker*, of *Bilborough*; and if theorems for the widths and heights of sluices to discharge given quantities of water per day be wanted, *Nicholson's Journal*, 8vo. vol. iii. p. 29. and 34. may be consulted with advantage. Those who may wish to see how the ingenuity of mill-owners can be exercised to secure themselves against possible injury, or even to thwart a canal scheme, may

perhaps consult the *Croydon* canal act, for the clauses relating to the *Wandle* river.

Where a connection is to be made with any other canal lying upon a higher level, or even the same level, where leakage or waste of water is to be apprehended, that would be prejudicial to either of the canals, it is usual to provide, that a stop-gate shall be erected at or near the junction, which one or both of the canal companies are empowered to shut and lock up whenever there is such a lowering or draught of water upon one of the canals, as would endanger the supply or lower the head of the other; clauses for these purposes will be found in the *Dearne and Dove*, *Dudley*, *Stratford*, *Warwick and Birmingham*, *Wyrley and Essington*, and other acts. And when any canal joins another, coming down from a hilly country, it is usual to require tall-gates to be erected, with capacious weirs for preventing of floods from the upper canals making their way into the lower one, as in the *Aberdeen* canal. It will very often happen, that tolls or dues will be to be paid by barges for entering any of the existing navigations from the new canal, or *vice versa*. And where the new scheme can be supposed to interfere materially with the trade on any former one, it has not been unusual to guarantee that their net profits or tonnage shall not be less, after the completion of the new canal, than before; or sometimes annual payments are agreed to be made as compensations for the expected losses to older navigations; and in some instances, where the rivalry is expected to be very formidable, as on the *Douglas River* by the *Leeds and Liverpool*, and the *Derwent River* by the *Derby* canal, provision has been made, that the old concern shall be purchased by the new proprietors at a fixed sum; the settlement of the various compensations that may be necessary on a canal are often such as to require the exertion of the utmost abilities of the engineer, with the most able assistance, as the very long and complicated clauses in many acts will shew.

On applying to parliament for any considerable extension of a canal, or to raise more money, there are instances, and perhaps very proper ones, of enacting that the shares of certain discontented proprietors should be purchased out of the new funds, as on the *Dudley*, the *Kennet and Avon*, and others.

So attentive has the legislature been, even to the comfort of proprietors or inhabitants near intended canals, that it has been enacted, as on the *Barnsley* canal, that where steam engines were to be erected in certain places, for the use of the canal, their fire-places should be so constructed as to consume the smoke.

Ample provisions should be made, for powers to make bye-laws for regulating the trade upon the canal, for the form and dimensions of the barges or boats to be used thereon, and for passing the locks, inclined planes, &c. that may be thereon. It is necessary to declare, that the canal is not to be subject to the interference of the general commission of sewers; manorial rights, and fisheries in old streams, or waters ought to be reserved; and it would be well for the encouragement of these great national improvements, if the legislature would permit a clause to stand, as in the older acts for *Bridgewater's* and other canals, that the proceedings and writings of the company should be valid without stamps.

It has been usual to enact penalties for a variety of offences likely to be committed upon the canal; and for malicious damaging or destroying of the works to declare the offenders guilty of felony, and liable to transportation for seven years. There are many other things which will require to be taken into consideration at the period of framing the act of parliament, some of which we shall avoid repetition by mentioning, when stating what occurs to us on the practice of executing
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and managing canals, to which we are now anxious to proceed.

The act of parliament for a canal being passed, and therein the time and place for the first meeting of the subscribers or proprietors thereof being fixed; one of the first businesses of such meeting will be the election of a *general committee of management*, consisting of the most independent, respectable, and generally informed persons among the proprietors. The committee of management will then proceed to elect a chairman and subordinate officers; to fix upon their place of meeting, and to arrange the order of their business.

It will not often happen that the engineer can be spared from the projection and superintendence of other great concerns, to attend to the cutting of the canal and erection of the several works, without the assistance of a *resident engineer*, or more than one, if the line be of considerable length, and distant parts of it are intended to be proceeded with at the same time; and the committee will do well to leave it to their engineer to recommend all such assistant or resident engineers from among those who have been brought up or employed under him, or are well known and approved by him, for their mathematical knowledge and practical skill, experience and attention in the several kinds of works that are to be executed. The attention of the committee should be directed to fixing upon some *land surveyor and valuer* of respectability and great practical knowledge, who has been used to and acquired address in the negotiation and settlement of purchases and exchanges of property of different kinds; and if he has before been employed upon canals he will be so much the more fit. In this stage of the business it may be well also for the committee to consider whether any *local committees*, or a *select committee*, may be necessary, to pay the more minute attention to, and to bring before them, the concerns of particular districts of the canal, and to serve other purposes.

The body of the proprietors, assembled in a general meeting for the purpose of completing the organization of the affairs of the company, will proceed to the choice of a certain number of auditors of their accounts, and to settle the salaries of all the persons that are employed.

Most canal acts direct, that two copies of the plan of the canal and book of reference, with any amendments or alterations that may have been made in parliament, are to be certified by the signature of the speaker of the house of commons; one of which is to be lodged with the clerk of the peace for the county, and the other with the clerk to the company, who are required to produce the same, and suffer copies or extracts therefrom to be at any time taken by any person, and to produce the original before the committee, or any jury who may be called on to decide any matter or dispute relating to the making or maintaining and using of the canal.

The engineer being now informed of the exact bounds within which the law has confined his operations, and of the several restrictions or alterations that may have been imposed or made since his former surveys, will, in all probability, find it necessary to look over the line and all the proposed works again, accompanied by the intended resident engineers; and, in such revival, it will be proper to divide the line of canal, and the several works thereof, into the necessary number of parts, and to give concise and definite names to each, that are to be used in future, in contracts and bills, &c. of which distinct parts or divisions a separate account of the expences should be strictly kept by the resident engineer, the *overseers*, or counters as they are generally called, (that the engineer is to recommend or employ upon the works) and by the office-clerks in a ledger, with proper

heads for each length of canal, set of locks, tunnel, embankment, deep-cutting, reservoir, aqueduct, or other great work, that may form a separate division: such particular and divided accounts of the works will prove of the most essential service to the committee, and to all others concerned, in informing and maturing their judgment on the actual or probable expence of every different kind of work; and will enable the committee to account to the proprietors how great, and sometimes unavoidable, as well as unexpected, expences may be incurred.

The committee should now well consider and inquire, whether any particular part of the line can be completed and opened with advantage, before the whole length can be got ready; and this being determined upon, the engineer should compare and consider, from the estimates and particulars that he possesses, the comparative length of time that every particular work upon the length intended to be first completed will require; and in this order, or with a proportionate exertion and number of men, should the several works be entered upon. Immediately after the plan has been settled, preparations should be made for providing all necessary utensils and implements.

The Act for a canal should give the company and their servants power to enter upon and occupy, for the temporary purposes of their works, heaps of soil, &c. any land except parks, orchards, and gardens, within the limited distance, on condition of their making a full and ample satisfaction, by annual rent, to the former occupier or lessee, and for all damage to the owner and occupier, so soon as the works are completed, and the heaps, &c. can be removed or levelled down, and covered with soil. The tunnels, deep-cuttings, embankments, or other great works, that are first to be begun, (and the levels, widths, &c. of which we suppose to be completely settled,) should be now marked upon the ground, with the necessary allowance of width for the slopes, and the spoil-banks, which the engineer may judge right to remain the permanent property of the company.

The land-surveyor should now proceed to treat, under the direction of the committee and the engineers, with the several parties who are entitled to the land that is wanted; for this purpose, it will be right for the surveyor to prepare correct and explicit plans and admeasurements of every piece of land, and, in many instances, to deliver copies of the same to the parties; to consider well the intrinsic value of the land to the owner, and of any extrinsic or artificial value which it possesses, with ample allowance for the injury that his remaining property will sustain by being detached, or by the fields being cut into inconvenient and awkward shapes, or on any other account.

It is generally provided, in canal acts, that where any person's estate is cut in two by the canal, and a part, consisting of less than a certain quantity, is severed from the rest, the company shall be compellable to purchase such detached part, if the party wishes it. And it ought to be provided, that the company are not to be obliged to make an occupation-bridge for less than a certain number of acres, unless the dwelling-house or farm-premises of the estate happen to stand upon such small detached part.

As soon as the surveyor has made his contracts or short agreements with the parties, containing a full description of the lands or other property to be purchased, the same will probably be put by the committee into the hands of the clerk to the company, with directions for him to enquire into the nature of the titles of the parties, and prepare conveyances accordingly, in the short and summary form that the Act ought to provide for such purpose: in like manner,

where the parties who own the estate could not be come at, or have not been brought to agree by the surveyor, he should furnish the committee with the particulars of such property, the price offered, and other particulars of the negotiation; in order that the clerk may be directed to prepare the necessary notices for a meeting of the commissioners described in the act, or a warrant to the sheriff of the county for empanelling a jury to hear the evidence, who are to be summoned on the part of the company, and those produced by the owner of the estate, and to view and examine the premises if necessary, and to give their verdict or assessment of the sum that is to be paid by the company, and accepted by the parties.

The ground for the necessary reservoirs, to supply the part of the line that is to be begun, ought to be among the first that is marked out, including space for the head or new embankment that is to be made, and should be treated for and purchased by the surveyor, and conveyed as above mentioned. The ground whereon the locks are to be built, or any wharf or walled basins are to be made, should also be carefully ascertained by the engineer, and purchased in an early stage of the business, in order that the summer seasons may be fully embraced, for the building of all the masonry and brick-work.

The modern acts for canals usually contain a clause, requiring all the top-soil to be removed. This, of course, will be attended to before any of the works are begun.

It has been found, from experience, that the banks of canals against which the water is to lie, ought, in general, to have their slopes so apportioned, that one foot in depth will give a horizontal base of one and a half foot; and to these or some proportions near them, rather above than below, as slopes of $1\frac{1}{2}$ to 1 are in general too small, will the widths at top and bottom, and the depth of the intended canal probably be fixed by the engineer: and it has been found convenient and proper to make up the banks of canals one foot higher than the water is intended to stand in them.

We are now to suppose the resident engineer to be proceeding with the setting out of the canal, being furnished with a map of the several fields through which it is to pass, the line that is provisionally settled for its course, but with liberty to deviate within certain limits therefrom, and with bench-marks which the engineer has left and described at certain distances, to regulate the top-water level, or height of the water in the intended canal; and, as above observed, one foot higher will be the level of the top-bank, or height of the banks.

It will be proper for this engineer, and we shall in future, for the sake of distinction, denominate the other the *principal engineer*, to trace the levels accurately of each pound or level reach of the canal, and to put in level-pegs or small stakes, at every two or three chains, more or less according as the ground is more or less undulating, as he proceeds; wherever the canal is conducted along the side of a hill, as will happen in a great portion of its length, the level-pegs are not to be placed exactly along the line that the principal engineer has marked out, but either above or below that line, as the slope of the hill may occasion, exactly at that point in every place, where the level of the top-bank (traced by means of a good spirit-level, with telescopic sights) cuts or intersects the surface of the hill. In some places it will be found that the principal engineer has drawn his line across the point of a hill, so as to occasion deeper cutting than usual, to avoid going round it; or, on the contrary, crossed a vale or low place, so as to require less cutting or perhaps none at all, to avoid taking a circuit

up that vale to follow the level of the ground; and if either of these deviations should be so considerable that the level-peg would fall more than two chains or thereabouts from the line, down or up the slope of the ground, the plan of having level-pegs upon the surface must be departed from, and holes should, in the first case, be dug at proper distances in the line, and pegs put into the same with their tops to the right height; or, in the second case, longer and stouter stakes should be used, particularly in the fences that are crossed by the line, or other places where they will not be liable to disturbance, and drove firm into the ground till their tops mark the right level. In tracing these levels, the engineer will refer to and compare his work with all the bench-marks before described, and at each end of a level or reach, will level up and down to the bench-marks of the reach above and below the one he has been working at, and compare the same with the fall that the locks at each place are intended to have. And we recommend particularly to the engineer to be very punctual in entering minutely in his field-book the particulars and situations of the several level-pegs, and to make one or more of the men who assist him in levelling, perfectly acquainted with the situations and distinguishing marks of them, and frequently to cause them to be looked over and renewed; or continual repetitions of considerable lengths of the work will be necessary, owing to the disturbance and loss of the pegs by the cultivation of the fields and treading of the cattle, or by the interference of idle and mischievous persons of the country. Too much caution cannot ultimately be taken, by frequent reference to the bench-marks, with due allowance for any accidental variation that may have been discovered among them, and repetitions of the levelling, to avoid those disgraceful blunders into which some less capable and less careful engineers have fallen.

We are now to consider, that the great *desideratum* in canal digging is, that the stuff that is dug from one part of the work, shall, with the least labour or distance of moving, exactly supply or form the banks that are to be raised in another; so that on the completion of the work, no spoil-banks or heaps of useless soil shall remain, or any ground be unnecessarily rendered useless by excavations or pits. Six different cases will be found frequently to occur in the cutting or forming of a canal. (*Plate I. Canal, figs. 1, 2, 3, 4, 5, and 6.*) A A E L P P' being, in every case, the line or surface of the ground across the canal; A B C E, in the first five cases, the bank on which the towing-path is to be made, and therefore generally the widest; L I K P in *figs. 1, 2, and 5*, the off or smaller bank; C I is the top, F G the bottom, and C F and I G the sloping sides of the canal, in every case. The bench or berm, I K, in *figs. 3 and 6*, is provided to retain and prevent the loose earth that may moulder down from the upper bank P K from falling into the canal. Sometimes the interference of proprietors, or other causes, may occasion the towing path to occupy the bank, or place of the bench I K, instead of B C, which will cause a considerable difference in the calculation or measure of the stuff to be moved in *figs. 2, 3, and 5*, but the same do not properly form new cases. The first case occurs most frequently in cutting across or along level meadows, and we were not so well able, when treating of the first survey or projection of a canal, as we now are, to explain a limitation which ought to be attended to in all such level-cutting, especially if of any considerable length, viz. that the height or level of the canal should be so contrived, that in any cross section, as *fig. 1*. the sum of the areas of A B C E and L I K P shall just be equal to E F G L, the part excavated or dug. It will readily be perceived that

figs. 4 and 6, are indeed other cases of level cutting, occurring wherever the principal engineer has, in crossing a vale, or point of a hill, found it necessary to preserve his level above or below what would otherwise have been desirable, if to be accomplished, as in our first case. The engineer will find abundant instances of *figs. 1, 4, and 6*, in all their degrees, and in a great portion of which there will either be a want of stuff to form the banks, as in *fig. 4*, or a redundancy from the deeper cutting, as in *fig. 6*, and the perfection of his skill will be shewn in so conducting the line, that every embankment, as *fig. 4*, shall have deep-cutting at both, or at least at one of its ends, to furnish the extra stuff, with the least expence in moving it; in like manner, every deep-cutting, as *fig. 6*, should have embankments at one or both of its ends, to receive the extra stuff. It is further evident, that the other three cases, viz. *figs. 2, 3, and 5*, are but varieties of side-lying ground, or wherein the canal is conducted along the side or slope of a hill; and where it is evident, that a proper choice of the situation of the canal, higher up or lower down the hill, may occasion *A B C E* and *L I K P*, the banking in *fig. 2*, together to be exactly equal to *E F G I*, the digging in this case; in like manner, where the slope of the hill is so considerable as to admit of no upper bank, as *fig. 3*, the bank *A B C E* may be equal to the cutting *E F G I K P*; it may be on a considerable slope that embanking is required, as in *fig. 5*, in order to preserve the most direct line, or to reach any particular object; or deep-cutting may, and often does, occur in sloping ground, and not in level, as we have shewn in *fig. 6*, but it seemed unnecessary farther to multiply our cases to delineate such varieties. An attentive reader will find no difficulty in tracing every possible variation, by considering the line *A' P'*, which represents the ground to vary in all degrees both of height and inclination, while the banks and canal, *A B C F G I K P*, remain fixed; and in this, almost the simplest inquiry that occurs in such a work, it cannot fail of appearing, how essential a good knowledge of mathematics is to every engineer, and that none ought to be admitted to that honourable distinction, who are unlearned therein, however much they may have seen, or even executed, under the orders of abler men.

Our second and third cases requiring more than ordinary consideration, before the line of the canal can be definitively settled, and the ground be marked out and purchased, unless waste is committed, in purchasing more than the company have occasion for; we have repeated them again in *figs. 7 and 8*; and therein produced the lines of all the banks, by which the situation of the level-peg, of which we have spoken above, is shewn at *a*. It is also evident, that the lengths and positions of all the lines, *BC, CF, FG, GI*, and *IK*, being given, as also the positions of the lines *BA, KP*, and *A' P'*; that the areas of the several triangles *a BC, b FG, b C I, c I K, e F g*, and *e C K*, and of the parallelogram *I K g G*, are known; and the calculation of these several triangles will generally, in practice, be very easy, from the consideration of their being all similar and isosceles. It is further evident, that the triangles *a E A, b E L, c P L, b E e*, and *i F E P*, are in general similar: from such considerations, theorems can be deduced, shewing, in every case, the distances *d L* and *d E* of the slope-holes, or edges of the cutting *L* and *E*, *fig. 7*, from the level-peg *d*, or of *d E* and *d P* in *fig. 8*; as likewise the distances *d I* and *d C* of the top edges of the canal, measured upon the level, from the level-peg; so that the stuff to be dug may just form the banks. The distances *d A* and *d P*, *fig. 7*, and *d A*, *fig. 8*, that determine the points *A* and *P*, at which the banks are

to be begun, are also easily deducible from the same considerations; and it is evident, that *A P* is the width of ground that ought to be purchased, except in such cases where a hedge may be necessary at *P*, or, as may sometimes be advisable, a hedge at the bottom of the slope at *A*, instead of its top *B*, when the necessary width for one or both of these hedges must be added to *A P*. The investigation of theorems for the above purposes, and others which we shall have occasion to mention, would lead us farther into the subject than would, perhaps, be proper, especially as no person ought, in our opinion, to undertake or meddle with the direction of such works, who is not only capable of using a theorem laid down by another, but of investigating and preparing rules for every case that can occur, or be wanting in his own practice. We proceed, therefore, to advise the resident engineer, on being furnished with the dimensions that the canal and its banks are to have, to calculate tables for readily finding the distance *d h* of the level-peg from the middle of the canal, measured on the slope of the hill, let the hill slope with whatever angle it may; or rather, let the angle *i d h*, or depression of the slope below the horizontal line *i d*, be what it may; and this will be most conveniently expressed, not in degrees, but by the natural sines of the angle of the depression; because then, if a measuring chain of 100 links be laid down at length, upon the slope of the ground, and the difference of the level of its two ends be taken in links by the spirit-level, these will express the two first figures of the natural sines of the depression, which is quite as great exactness as such tables need be calculated to. The engineer will now proceed to put in a stake opposite to each level-peg, at the proper calculated distance down the slope, for the approximate or supposed middle line of the canal: these stakes will seldom be found for any considerable distance together, to range in a straight or in any other regular line, that will be proper for the canal: and a very difficult and nice part of the engineer's duty is now to be performed, in staking out a new line with a taller or a quite different set of stakes from those formerly used, to avoid confusion; this is called staking the middle range of the canal. The requisites in this new line or range for the centre of the canal is, that it should as nearly coincide in every part with the stakes that were last put in by the calculation, as possible; that, where, in order to preserve a regular and handsome line, and avoid the awkward, inconvenient, and unmeaning crooks and bends, with which too many of our canals, and even some of the latest construction, are almost in every part disgraced, the line is conducted higher than the calculated stakes for one or more stakes together, care must be taken that it shall quickly be conducted below others, so that the redundancy in cutting deeper into the hill in one place may be as exactly as possible balanced by a deficiency just by, owing to the line being conducted below the level-stakes. Besides the consideration above, it will be the time now to estimate and consider the quantity of stuff that will be wanted to land up every bridge and lock, and to give extra thickness to the banks on which any toll-houses, warehouses, or other buildings, are to be erected, or trade carried on.

In narrow canals, or branches of that description, it will be necessary to provide for wider places at short intervals, for barges to turn, and to lie in while others pass them; considerable skill and care are requisite in the choice of proper places for such purpose: they ought to be so situate that barge-men can mutually see each other approaching on narrow canals or branches, and provide for passing, without either of them having to drag their barge back again to a passing-place, as too often happens; at the same time, they

ought to be chosen, if possible, in such hollow or low places as will admit of widening the canal without much extra expence. Another consideration is, the excavation of basons, docks, or wharfs, from which stuff may accumulate, which ought to be used up, if possible, in embanking the line just by. Many canal companies have seen it their interest, on proper and timely application from land-owners, who were desirous of erecting wharfs, to direct their engineer to calculate upon, and to excavate the additional width necessary for such purpose, at the company's expence; this and the extra or deeper cutting that there must always be, in the approach to a lock on the lower side, and of embanking on the same approach on the upper side, should also be well considered and accurately calculated; and full and explicit memorandums ought to be entered in the engineer's field-book at the time, where the stuff was calculated to be had from for every embankment, and where the stuff is to be disposed of from every deeper cutting or extraordinary excavation. These memorandums will prove of the most important use in the revisal of the whole length of line or district that is about to be fixed; as also, in contracting for and letting of the work afterwards, by being able, without fear of mistake, to point out which way every part of the stuff is to be thrown or wheeled, as fast as it is dug, and that no part of the same may want moving a second time, or any wide or gouty places be made to disfigure the canal for finding stuff; or, what is often of more fatal consequence, the canal being dug deeper than usual for such purpose.

After the line shall have been thus marked out with the utmost care, it will still be prudent for the engineer to revise it again, and to make pretty accurate calculations of the quantity of stuff wanting, or to spare in particular places; in these kinds of calculations the engineer will find the most important aid in a ready use of the *slide-rule*; and we beg here to mention that a gentleman who has long distinguished himself by the various and important uses to which he has made the slide-rule subservient, has prepared a short but complete tract on its application in the concerns of an engineer, which it is hoped that he will ere long publish. Perhaps, on the review of the line, the curves or bends thereon may in some cases be eased, and beauty and convenience may be more fully attained without much, or often any extra expence. The *Droitwich* canal has been mentioned as one on which these points have been the most fully attended to. The portion of the canal that has been thus staked out and revised, may now have the boundary lines marked out of the land to be purchased; and the surveyor should proceed without delay to survey the same, and to treat with the owners for the purchase, as we have before mentioned. It will be among the first works to dig out for the foundations of the locks, if they are not already in hand, and for the bridges, if the season of the year and supply of bricks and work-men will admit of their proceeding immediately: the several drains or culverts that are to pass under the canal should also be dug out, and prepared for the masons or bricklayers, and the several safety-gates, stop-planks, weirs, and other erections, which we shall notice more particularly further on. It may be proper here to caution the engineer, that in case the pipes of any water-works, or that supply any gentleman's house, cross the line of the canal, such pipes should be laid at once, two or three feet beneath the bottom of the intended canal, with an easy descent and ascent therefrom, and the ground be made good again as soon as possible, both to prevent their being damaged in cutting the canal, and being exposed to frost, or to thieves, if of lead, by lying bare; and in case such pipes are found old or decayed, new ones of lead or cast iron

should by all means be laid in the deep part under the canal. The top-soil should be carefully removed; and in order to determine readily and correctly the places of the slope-holes at E and L, *fig. 7*, and E and P, *fig. 8*, the engineer will find it useful to calculate the distances of d E and d L, and d P, by a general theorem, in terms of d h and h i, and to make tables for the several values of those data, that are likely to occur. The values of d P and d A, *fig. 7*, would be alike useful in a table for determining the limits of the banks that are to be raised.

Before cutting out the lock-spit, or small trench between the several slope-holes, as a guide to the men who are to dig, the engineer ought to cause holes to be dug in the line of the canal, near every second or third level-peg, or oftener, if the soil be variable, in order to prove the soil to a greater depth by two or three feet than the cutting of the canal is to extend; and each of these the engineer ought carefully to inspect, in order to determine what puddling or lining will be necessary; and what will be the difficulties of digging, owing to the hardness of the stuff, or to water that must be pumped out, &c.; all which circumstances, as well as the extra distance that any part of the stuff may require to be moved, must be well considered before the work can be let to the contractors or hag-masters.

The *puddling* or *lining* of a canal, to make it hold water, is a matter of the greatest importance, and we shall consider five cases, in *figs. 9, 10, 11, 12, and 13*, that are likely to occur or present themselves in the search, into the soil that is to be dug, by sinking holes as above mentioned: the first case we suppose to be that in which the whole is clay, loam, or other water-tight stuff, as shewn by the dark shading in *fig. 9*: all soils that will hold water, and not let it soak or percolate freely through them, are called water-tight. Our second case, *fig. 10*, is that in which the whole cutting will be in sand, gravel, loose or open rock, or any other matters that will let water easily through them, and such are called porous soils or stuff. The third case we suppose to have a thin stratum of water-tight stuff on the surface, shewn by the dark shading in *fig. 11*, and to have porous stuff for a considerable depth below, here distinguished by dots. The fourth case may have porous stuff near the surface, and water-tight stuff at the bottom of the canal, as in *fig. 12*. The fifth case is that where water-tight stuff appears on the surface, as *fig. 13*, below this a stratum of porous stuff, but having again water-tight stuff at no great distance below the intended bottom of the canal. The new raised banks that are left unshaded in all the five figures, are always to be considered as porous stuff, as indeed they will always prove at first, and in a great portion of soils they would ever remain so, unless either puddling or lining was applied; all ground that has been dug or disturbed must also be considered as porous. It should also be remarked that any kind of soil which is perforated much by worms or other insects, should in canal-digging be considered as porous stuff. *Puddle* is not, as some have attempted to describe it, a kind of thin earth mortar, *spread* on places intended to be secured, and suffered to be *quite dry* before another coat of it is applied; but it is a mass of earth reduced to a semifluid state by working and chopping it about with a spade, while water just in the proper quantity is applied, until the mass is rendered homogeneous, and so much condensed, that water cannot afterwards pass through it, or but very slowly. The best *puddling-stuff* is rather a lightish loam, with a mixture of coarse sand or fine gravel in it; very strong clay is unfit for it, on account of the great quantity of water which it will hold, and its disposition to shrink and crack as this escapes; vegetable mould or top-soil is very improper, on account of the

the roots and other matters liable to decay and leave cavities in it, but more on account of the temptation that these afford to worms and moles to work into it, in search of their food: where puddling-stuff is not to be met with, containing a due mixture of sharp sand or rough small gravel stones, it is not unusual to procure such to mix with the loam, to prevent moles and rats from working in it; but no stones larger than about the size of musket bullets ought to be admitted. That the principal operation of puddling consists in consolidating the mass is, we think, evident, from the great condensation that takes place: it is not an uncommon case, where a ditch is dug, apparently in firm soil, that though great quantities of water are added during the operation, yet the soil that has been dug out will not more than two thirds fill up the ditch again, when properly worked as puddle. It should seem also, that puddle is rendered by that operation capable of holding a certain proportion of water with great obstinacy, and that it is more fit to hold than transmit water. It is so far from true, that puddle ought to be suffered to get quite dry, that it entirely spoils, when by exposure to the air it is too much dried; and many canals which have remained unfilled with water during a summer, after their puddling or lining has been done, have thereby become very leaky, owing to the cracks in the puddle-ditches and linings. One of the first cares of an engineer, when beginning to cut a canal, is to discover whether good puddling-stuff is in plenty, and if it be not, it must be sought for and carefully wheeled out or reserved wherever any is found in the digging; or perhaps procured at considerable distances from the line, and brought to it in carts. It has happened in some stone-brach or loose rocky soils, that all the puddling-stuff for several miles of the line, required to be brought to it; but even this expence, serious as it may be, ought not to induce the copying of those, who have left miles of such banks without any puddling, and have made a winter canal, but which no stream of water that is to be procured can keep full in the summer months. It is usual in canal acts to insert a clause for the security of the land-owners, to require the company to cause all the banks that need it to be secured by puddling, to prevent damage to the land below by leakage: and it would have been well for all parties in many instances, if this clause had been enforced. It appears that the Dutch have been in the habit of making mud-ditches to secure the banks of their canals and embankments, from time immemorial; and that operations similar to our puddling have been long known on the continent, but it is not clear at what period it was introduced into this country; we think that the fens of Cambridgeshire and Lincolnshire, in which so many works have at different times been executed by Dutchmen, are the most likely places in which to search for early evidence of its use. We cannot think that *James Brindley* was the first who ever used it in this country, although we might admit that the *Bridgewater's* canal was the first in which it was systematically used as at the present day. If we compare our first, fourth, and fifth cases, *figs. 9, 12, and 13*, we shall find in all of them a water-tight stratum as the basis; and the practice in these cases is to make a wall of puddle, called a puddle-ditch, or puddle-gutter, within the bank of the canal, as shewn in section, by *ac*, in the above figures; these puddle-gutters are usually about three feet wide, and should enter about a foot into the water-tight stuff, on which they are always to be begun: and they should be carried up as the work proceeds to the height of the top-water line, or a few inches higher. Our second and third cases, *figs. 10 and 11*, evidently will not admit of the above mode, because we have here no water-tight stratum on which to begin a puddle-gutter as a

bottom: in these cases, therefore, it is usual to apply a lining of puddle to the sides and bottom of the canal, as shewn by the cross shading in *figs. 10 and 11*: the process of puddling and lining will occur more properly further on, as we proceed in describing the operations of digging and forming the canal.

In order to describe more intelligibly the process of setting out and digging a canal, in the two cases where *puddling* or *lining* will be requisite, we have repeated our first and second case, but on a larger scale, in *figs. 14 and 15*; wherein *p* is intended to represent the hole that has been before supposed to be sunk, in order to prove the soil; and, according as this terminates in water-tight or porous stuff at its bottom, that puddle-ditches, *qefw* and *xefl*, *fig. 14*, or a lining, *qrst* *HGF D*, *fig. 15*, is to be applied; *DH* being the height to which the water is to stand in the canal. The engineer will in the first case determine the place of *E* and *L* on the ground, and dig small holes or nicks to mark the same, called slope-holes; but in the second case other marks must be made at *n* and *v* about five feet from the former, to direct the beginning of the cuttings, with allowance for the lining. A skilful and very handy workman is now required to mark out the line upon the ground, called the lock-spit, between the slope-holes at *E*, *fig. 14*, above-mentioned, which we have supposed to be made at about two or three chains from each other. This is done by laying down and stretching a strong line upon the ground, between two or more adjoining slope-holes, and if the canal is not to be straight in that part, with small pegs to give it the gradual and regular bend in every part that the canal is to have; the workman then proceeds, holding his spade or grafting tool not upright, but always with the slope *CE*, that the bank of the canal is to have, and strikes it successively into the ground close to his line, until the whole length of the line is marked out; by this means, if the ground has sudden undulations, or hollows, as continually happens, owing to the ridges and furrows of cultivated lands, and other causes, yet a regular line coinciding in every part with *E* is marked out upon the surface; before the line is taken up, another labourer follows on the other side of it, and strikes in his tool inclining the contrary way, by which a triangular sod or piece of earth is cut and thrown out: a similar lock-spit must be cut on the other side of the canal at *L*; and the same at *n* and *v* in *fig. 15*. If neatness and regularity are properly consulted, lock-spits for the extremities of the banks at *A* and *P* will also be proper, especially if the land *A A'* and *P P'* is valuable, and the damage by the scattering and laying of the stuff would be considerable. The engineer has now to determine, in *fig. 14*, the points *c* and *d* for the beginning of the puddle-ditches, and these he ought to chuse such, that if the same were carried upright to the top-bank, *b C* or *I a* would be about one foot: if this is not strictly attended to, the labourers or navigators, as they are called, will for their own convenience begin their puddle-ditch much too near the canal at *E* and *L* in some cases, and not make it upright but hatching back to arrive at *ab*; and puddle-ditches so made are apt, owing to the settling of the bank, to get broken and be spoiled. It may be proper here to remark, that canals set out with the scientific precautions and care that we have recommended, will always have the proper quantity of stuff to allow for the settlement of the banks, because $ABCE + LIKP = EFG L$, in the same settled or consolidated state, that the latter part was before the digging commenced: it will, however, be proper to give the contractors a table or rule shewing, according to the height, as *ac*, what extra height a suddenly raised bank is required to be, to allow for settling: and it is evident that

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the slopes of such banks must be steeper in the first instance, than they are intended ultimately to be.

We may now suppose the engineer to proceed to the letting of the cutting of certain lengths of the canal to contractors or hag-masters, who will employ a number of navigators under them, in digging and puddling the canal. It is usual to let the work at a certain price per cubic yard of digging, and to pay for the puddling and lining either at a certain price per cubic yard, or per yard run of the canal. The engineer ought to inform himself thoroughly on the difficulties and facilities which attend the work he is about to let, and to draw up a short but explicit contract to be signed by the contractor. We cannot but recommend that all contracts for material or large jobs of work, not only in cutting, but for the mason's, and other works in particular, should be submitted to the principal engineer for his approbation, before they are signed or finally concluded on. The prices allowed ought to be fair and liberal, according to the circumstances, so that the contractor may have no pretence on account of low prices, to slight his work, particularly the puddling; and they ought in every instance to be strictly looked after, and made to undo and renew immediately, any work that shall be found improperly performed. We recommend it to the engineer to keep a strict account, by means of his overseers or counters, of all the men's time that are employed upon the works; distinguishing particularly the number upon each work, and whether employed by the day, under the company, or upon the work that is let to contractors. These particulars are most essential towards knowing, what money ought to be advanced to the contractor during the progress of his job, and towards informing and maturing the judgment of the engineer, in the length of time that a certain number of men will be in performing any future work that he may have to direct; and a calculation ought to be made in every instance of the day-work, and compared with the contract price, by which alone a correct judgment can be formed of the proper prices at which work ought afterwards to be let, so that the labourers may receive proper wages, proportionate to their exertions, and the contractor be amply paid for his time, skill, and superintendence; and yet economy and the interest of the company be duly consulted. Barrows and wheeling-planks, horsing-blocks, and other implements, are generally found by the company; and it is usual to consider 20 to 25 yards, to be a stage of wheeling, and a price per cubic yard to be fixed, according to the number of stages that soil is to be moved: where this distance exceeds 100 yards, it will not often be eligible to perform it by wheel-barrows; and runs of planks with an easy descent, if the same is practicable, should be then laid for large two-wheeled barrows, or trucks to be used thereon.

The cutting of a canal being let, the work is usually commenced by a labourer, on the part *Eg*, *fig. 14* or *15*, on the lower side of the canal; and from the lock-spit at *E* he marks out a certain width to *g*, such that he can throw or cast the stuff as he digs it, on to the part *Ac*, and so that the heap may not obstruct the intended puddle-gutter *cd*. The side *EF* he is careful to cut down in the proper slope of the bank; the other side is usually cut straight down, and this work is continued until he comes to the bottom of the intended canal at *Fh*, and this space *EFhg* is called the "reaching." The same process is followed on the lower side of parts that want lining, as *fig. 15*, except that *nrbg* is the reaching in this case, and that there is no necessity to throw the stuff further in this case, than that it may lie upon *nA* without rolling back into the work; and it is usual, if the reaching will not be very deep, to lay two or

three rows of fods or found spits of earth, with regularity in the face of the slope *ng* to form part of the bank, and to throw the other stuff over these. Reachings are also to be dug on the upper side of the canal, as *ikGL*, or at least as much stuff is to be thrown out therefrom as can conveniently be stowed upon *dP* and *vP*, *figs. 14* and *15*.

It is now time to commence the puddling in *fig. 14*, and a labourer begins by digging out the bottom of the intended puddle-ditch *cefd*; if the soil dug out is good puddling-stuff, he lays it on the part *dE*, if otherwise he throws it at once on to the heap on *Ac*. A careful examination of the face *EF* of the reaching will shew to what depth the puddle-ditch *df* ought to be carried in every part, to reach and intersect any faulty places, or veins of lighter soil, or worm, rat, or mole-holes that may accidentally occur in the bank. After the puddle-ditch is dug clean out to its proper depth, and this is a circumstance that the engineer or some careful overseer ought always to look particularly to, about 9 or 10 inches thereof is to be filled loosely up with puddling-stuff, either from that which comes out, or from the nearest heap in reserve, all large stones, sticks, straws, or other extraneous matters being carefully picked out as the stuff is sprinkled in: by this time, unless the season is very dry, it is probable that some water will be collected in the bottom of the reaching *Fh*, and this should be laded out with a scoop into the puddle-ditch, so as to give the stuff therein a good wetting; if the puddling-stuff be of the stiffer kind, or was very dry, it will be right for the labourer to betake himself to some other part of the work for two or three hours, but perhaps giving his stuff another sprinkling of water in the interim; he may then proceed with the puddling; and for this purpose he ought to be provided with a stout pair of puddling-boots, that will keep out water; he begins at one end of the trench, and keeps chopping with his tool into the stuff and quite through it, giving his tool a lunging motion every time before it is withdrawn, so as to let the water into and to stir every part of the puddling-stuff; if more water is wanted, another labourer is set to lade it out of the reaching as before; and the puddler thus proceeds, chopping down at every inch or thereabouts as he slowly advances, and trampling about at the same time as much as he can with his feet, which greatly assists the operation: when arrived at the end of the trench, he returns and repeats the same operation, until every part of the puddle is properly worked; which is known by the tool going equally easy into it in every part, which it would not do if any dry lumps remained, and the whole being in a semifluid state; giving the puddling-stuff just the due quantity of water is very essential to its working well, and this, experience will soon point out.

Very great care and management will, in general, be required on the part of the engineer, to furnish water for the puddling: it will often require to be brought in temporary trenches, perhaps across several fields from some mill-dam, large pond, or spring of water above the canal; for which purpose general powers ought to be given in the act, upon condition of levelling and making all such trenches good again as soon as possible, and paying for the damage; often times puddling water is not to be had without pumping it up, and conveying it considerable distances in troughs, of which great numbers will be required. It will very often be requisite to convey the water across the canal in troughs to the different puddle gutters, and plenty of trestles should be in readiness for supporting these troughs at the requisite heights. Considerable care will be necessary to turn off the surplus water, into some channel where it can run off without flooding the works; or to stop it at its source; this last ought always to be adopted, when the supply is not very plentiful,

plentiful, or the owner of the stream or pond might be injured by taking a constant stream from him, during the progress of the work. The first or bottom course of puddle being properly worked as above, it should then be suffered to stand two or three days undisturbed, and without any more water being given to it; when it will be found sufficiently set that a man may step on to it without sinking in; it is then ready to receive a second course; the first step is to scrape off and remove any lumps of earth, stones, sticks, or other matter which may have fallen into the puddle-ditch; about 10 inches thick of puddling stuff is then to be sprinkled lightly into the ditch as before; and water is to be applied either from the reaching, or from some of the troughs which we have been mentioning: some hours time is to be allowed for the stuff to soak, unless it be light loam, and moist at the time of putting it into the ditch; in such case, the puddling may be begun almost immediately: care must be taken that the tool be made to penetrate a small distance into the old puddle at every chop, in order that the two courses or layers may be properly incorporated. After this course is properly wetted and worked, it must stand the proper time to set as before, but by no means to get dry, otherwise it will be found full of cracks and must be worked anew: and in case, owing to any temporary suspension of the work, it should be necessary to leave a puddle-ditch before it is finished, it ought always to be covered, and left with a dry or unworked course of puddling-stuff upon it, to keep the air from it, and preserve the proper moisture in it.

When a sufficient number of courses of puddle have been added, to fill up the ditch *cefd*, two or three rows or courses of fods, or spits of earth, must be laid on each side, to raise the ditch so much higher; at the same time that the heap of stuff on *Ae* is levelled down, and other stuff is brought by the men, who are wheeling from the bulk *ghki* that is left in the middle of the canal, and laid on *dE* to back up the spits or fods: after cleaning the surface of the puddle, if properly set, it will be ready to receive another course of puddling-stuff, the water must be turned on, it must have time to soak, if necessary, and then be worked and stand to set as before: other rows of spits of earth may then be laid, to raise the sides of the puddle-ditch, and the bank may be made up to the same height by fresh stuff wheeled in from the canal; and care being taken to lay spits of earth to form the slopes *AB*, and *EC*, as the works proceed upwards, particularly the inside slope *CE*, which should be well trod and consolidated by strokes of the tool to prevent its falling down, or being disturbed by the water when the canal is filled; another course of puddling-stuff is then to be added, and all the same process gone through till the puddle has arrived at *qw*, the height of top-water, or an inch or two higher, which being properly set, the bank is to be made up, covering the puddle completely up with common stuff, to the intended height of the top-bank *BC*, with proper allowance for the settling; and observing that the puddle will not settle near so much as the other stuff, if at all. The process is no way different, by which the other bank *LIKP*, and its puddle-ditch, are to be carried up, and completed to the intended height. The part of the canal, with puddle-gutters, *fig. 14*, of which we have been speaking, has, in general, a lump or ridge of stuff remaining in the middle of its bottom, until the very last: a different system ought, however, to be pursued with such parts, *fig. 15*, as require to be lined; here the banks *ABqn*, and *vtKP* may be at once made up, and the whole of the space *nrsv* ought to be cleared for certain distances, before the lining of the bottom can be begun. A great deal of management is required by the overseer or contractor, to manage all these

parts of their business, so that there is no hindrance of any part of the work, that every man is provided with stuff by the wheelers, when he wants it to make up his banks or to puddle, and that the parts to be lined are cleared in time. To accomplish all these objects, a good part of the stuff cannot be wheeled directly out to the nearest or opposite points of the bank, but it must be worked forwards and backwards obliquely, on the runs of wheeling planks by the wheelers, as occasion may require. It may often be necessary to exceed one or two, or perhaps more, stages of wheeling, to avoid taking out the stuff and clamping it, by which it would require filling again, damage would, in most cases, be incurred on the adjoining lands, and frequently the puddling and working of the banks would be impeded, by crossing them to land the stuff.

A length of the canal that is to be lined being cleared, and the bottom levelled and cleaned smooth down to the line *rs*, a course of puddling-stuff about 10 or 12 inches in thickness is to be spread over it, with all the precautions, to extract extraneous and hurtful matters, which have been before given, and the whole is to be wetted and allowed to soak if necessary, as before: the working of this puddle is now to be begun; and as the extent will generally be large, several men may be employed, at once, upon it, so as to make it worth while for an overseer employed by the company, to attend them constantly to see that no part of the work is slighted: as the bottom in this case is supposed to be sand, loose rubble of a rock, chalk, or other matters, that would injure the puddle if mixed therewith, we have recommended a thicker course at first than is usual of puddling-stuff, and in working the same the men ought not to strike their tools deeper or even quite so deep as the bottom of the puddling-stuff to avoid disturbing the bottom. When this course of puddle has been allowed to set, another course of about nine inches is to be added, and treated as before, till about three feet of puddle is added, if the soil is very porous; and the top course being set, a course 18 inches or two feet thick of the common soil or stuff should be laid evenly upon it and the bottom levelled; this covering of the bottom should be rather dry, and not in large lumps, or with great stones or sticks in it.

The lining of the sides is now to be proceeded with as follows; the top covering of the bottom should be removed for three feet in width next each of the sloping banks; and the surface of the puddle be carefully cleared of dry lumps, stones, &c.; a thickness of nine inches of good puddling-stuff is now to be laid in this place and wetted and worked, and allowed to set as before directed, when another nine inches is to be added in like manner; some common stuff from the digging of the canal is then to be brought in spits or fods, and carefully piled up for two feet in width, and about nine inches in height, hatching-back before and behind, agreeable to the slopes *FE* and *GL*, and leaving a space or puddle-ditch behind, next to the sides *rn*, and *sv*; the surface of the puddle at the bottom of these is to be carefully cleared, nine inches of puddling-stuff applied, wetted, worked, and allowed to set as before: more spits or fods are then to be piled in the front, as a facing to keep up the puddle, and their interstices should be filled with fine stuff to make the whole solid; when puddling-stuff is again to be applied behind, and the same process repeated till the puddle and facing arrive at *qD* and *Ht*, when the remainder is to be made up with dry stuff and spits to the top-bank level at *C* and *I*, as directed in the former case.

The last of these ways of making a canal water-tight is the more tedious and expensive of the two; it is however general, and may be applied in any situation with perfect success.

success. Mr. Thomas Telford, in *Plymley's Agricultural Report of Shropshire*, 8vo. p. 296, when speaking of the *Shropshire canal*, says, "This canal, carried over high and rugged ground, along banks of slipping loam, over old coal-mines, and over where coal-mines and iron-stone are now actually worked under it, is a satisfactory proof that there is scarcely any ground so difficult but where, with proper exertions and care, a convenient water conveyance may always be obtained." And we have heard of instances of canals being conducted over ground so rocky, and abounding with such great chafms, and loose pieces of rock, that many yards together of the canal bottom might have fallen in, had not the precaution been first taken, of removing all the smaller and loose stones and rubbish, and wedging in the large loose pieces of rock with stones, set in mortar, and thus rendering the foundation sound, on which soil to fill up the inequalities, and a lining and facing was applied as above, with perfect success. We have already observed, that some persons have thought it right to omit puddling or lining, where springs appeared in the bank of a canal; and the matter is of so much consequence, that we beg farther to observe, that the appearance or non-appearance of springs ought in general to have no effect in determining the propriety of these essential measures; if a spring is of any use to a canal it will rise, owing to the puddle-ditch or lining, and run over the same into the canal, and no water will be thereby lost; and if it will not so rise, it may safely be ranked as a drain of the most mischievous kind, instead of a supply, and therefore very essential to be stopped up.

In case it is found that there is stuff to spare after completing the banks, it will sometimes be advisable to remove the top-soil from A' A in low places, and after spreading the extra stuff so as to make the ground good, to return and spread the soil upon it: the part P' P' will often admit of similar treatment, and sometimes sudden hollows there may be filled up, so as to have a fall to the top-bank I K, and avoid a deep ditch through an adjoining swell or rise of the ground at P, to carry off the rain water to a culvert where it is to pass under the canal: where it happens that P' P' is waste or ground of little value, or the company is possessed of a piece that they have been obliged to purchase and cannot readily dispose of, it may be proper to make a heap or spoil-bank of any extra-stuff, to be afterwards boated away as occasion may require. If a deficiency of stuff is experienced to complete the banks, the part P' P' furnishes a good resource in many instances; the top soil being removed on the higher parts, an excavation like P y P', *figs. 14 and 15*, may, and indeed must in many instances, be made with a proper fall for conveying the rain-water that falls in every part above the canal to the brook or culvert that is to take it off; the slope P' y ought to be so easy, and the top-soil so spread, that the land shall be as fit for agricultural purposes afterwards as before. Another resource ought in an earlier stage of the business to be provided, in the deep-cutting, by marking out a yard or two or more width of ground to be purchased on the upper or deeper side, than is actually wanted, by which a great deal of stuff may be procured at a comparatively small expence of land: it must be evident, that the resources we have pointed out above are inadequate to receive any great redundancy, or to supply any great deficiencies of stuff, and are only sufficient where the canal has been set out with scrupulous care; bungling, or careless canal-makers must be content to leave lasting marks of their incapacity or folly behind them, in the many sudden bends into the hill that they are obliged to make to obtain stuff, and out of it to dispose of the same in other places, with numerous wider or deeper places on the canal to make

up the banks, or in enormous spoil-banks or useless excavations. Where a reserve of stuff has been made in the deep-cuttings at several points on each level or reach of a canal, as above-mentioned, it will be the better fault of the two, to experience a deficiency of stuff; because as soon as the bottom of the canal has been cleared, and the lining of the bottom and sides for some height performed, or the puddle-ditches carried up, the canal may have 18 inches or 2 feet of water let into it, and dirt-boats may be used to carry stuff from the deep cuttings to make up the banks in other places; whereas all redundant or spare stuff must be got out before the bottom lining can be applied, or any effectual use made of boats to move stuff from place to place; and the same advantages will be experienced in situations where puddling-stuff is only to be procured at particular points on the line, by clearing out and completing the bottom part of the canal for considerable lengths, so that dirt-boats may be used to bring the same for the puddling or lining of the upper part of the banks, which, if there is spare stuff, cannot be effected without heavy expences in moving the same and forming spoil-banks. Where the line of a canal is to cross an extensive stratum of valuable brick earth, or one of good gravel for making of roads, it will often be advisable, especially if the line can be rendered more direct thereby, when setting out the canal, to cut pretty deep into such materials, and even quite through the gravel, if the same is practicable, as might have been done at Dawley-deep, between Paddington and Uxbridge, on the *Grand Junction* canal; for although considerable expence will in the first instance be incurred in digging and in damage for spoil-banks, yet such materials, as good brick-earth and gravel, will in almost every instance find a market as soon as the canal is opened; such a situation of the canal may prove of essential service to its trade, by enabling the adjoining proprietors to work the whole thickness of their brick-earth, gravel, or other useful matters, and destroy but very little of the surface of the ground, and without being annoyed by water, but which the canal would catch in very considerable quantities perhaps, instead of losing water by preserving a high level through porous stuff. It is highly to the interest of a canal-company to give facility to the getting and conveyance of all useful articles within their district, at the cheapest possible rates, as the only means of opening new sources of trade or manufactures, by which their concern will be in the most essential degree benefitted. In districts where stone and gravel for making and repairing of roads are scarce, it will be proper to pay the labourers certain rates per cubic yard for all the stones or gravel that they may collect out during the work, and stack in proper places; as resources for the making of the towing-path C I, *fig. 15*, and for making good the landing or ascent to the several bridges, and the several pieces of new road that the engineer will have to form, near to the canal and bridges; the lock-banks and all wharfs and landing places should also be covered with good gravel to render them safe and convenient for use: if good gravel can in places be intersected in deep-cuttings, much of the above expence, as well as of cartage, may be saved, by an early use of dirt-boats in the bottom of the canal. It cannot, we think, have failed to strike every reader ere this, how very important and various the duties of the resident engineer are; but the same will be much more apparent, when we shall have finished, in the following pages, the more particular observations that occur to us under the heads of reservoirs, feeders, aqueducts, embankments, culverts, safety-gates, weirs, tunnels, deep-cuttings, locks, substitutes for locks, inclined planes, rail-ways, bridges, towing-paths, fences, drains, boats, towing or moving

ing boats and trams, cranes and implements, &c. of which we shall proceed to treat; after observing, that none but men of the strictest integrity and extensive knowledge ought to be employed as resident engineers, and that the committee and principal engineer ought not to hesitate in offering and paying such men a very liberal salary, to engage the whole of their time; and, that too great a length of line or extent of business should not be put upon such a man. This is the proper sphere, where young men or others, of knowledge and persevering industry, who are coming forwards in their profession, should exercise and give specimens of their abilities as engineers; and it will prove of the utmost importance to such, as well as to a company who have an extensive line of canal to construct, to employ more than one of such men at the same time, upon adjoining lengths of the canal; where their emulation may be excited in an honourable contest, as to those who shall execute their portion of business in the most complete, orderly, and economical manner.

One of the first considerations relating to the *construction of a Reservoir* for supplying a canal, is the supply of water that is to be expected for it, and in what proportions at different times of the year: for this purpose we suppose the engineer to be furnished with an accurate survey of the vale or vales that lie above the intended reservoir, so as to be able to calculate exactly, how many square miles and fractions of surface drain towards or vent their rain-water through the part intended to be embanked for the reservoir; it will be very proper also to be furnished, if possible, with the exact gauge or quantity of water that has actually in former years been discharged by the brook or stream that is to be embanked; as also with the quantity or depth of rain which usually falls within the drainage of the intended reservoir. If the length of time that has elapsed, since the situation of the reservoir has been determined on, has not allowed of careful and accurate experiments being made on these points, the engineer must assume them from the best data that the information of millers and other persons will afford, and the printed tables, or journals of rain, kept by curious persons in the nearest similar situations, must be consulted: it is particularly necessary to attend to this last circumstance, because there are, we believe, instances of places where the annual depth of rain does not amount to a foot, and others in which it exceeds five feet; while 23 inches is about the medium depth of rain annually, at or near London. The most perfect method of obtaining true information on this subject, is to gauge the different springs or streams, from whence the supplies of water are to be derived, and thus to ascertain the exact surplus, after the mills are amply furnished. In the great contest about the Rochdale canal, Mr. Rennie had all the streams, which could be affected by the proposed reservoirs, gauged for about a year. He first ascertained the state of these streams at a time when the mills were amply supplied with water, and had proper gauges fixed upon them. The daily difference was measured, and the surplus thus ascertained amounted in the year 1793 to sixteen times the ordinary produce of the rivers. The evaporation that takes place, from a given surface of water in different places, has not yet been so accurately observed as the importance of the subject to canal engineers deserves: Mr. Bewan's observations thereon, at Leighton-Buzard in Bedfordshire, continued for five years, to the end of 1804, gave an evaporation of 22.92 inches at a medium per annum, while the depth of rain there, in the same period, was observed to average 23.28 inches; in some years the evaporation considerably exceeded the depth of rain, and in others it fell as much short of it or more. On this subject, see the article *EVAPORATION*.

It will sometimes happen, that the valley in which the reservoir is to be made, has other valleys parallel to it, on one or both of its sides, such, that by beginning a fough or small tunnel above the level of the reservoir, continuing it with a small rise through the adjoining hill, and from its further end continuing a ditch or feeder along the side of the hill rising gently as it proceeds till it intersects the bottom of the vale, a brook or considerable stream of water may at times be there intersected and brought into the reservoir; or, another case may happen, in which the adjoining valleys instead of being parallel to, proceed directly from the reservoir valley, and yet feeders may be set out, so as to collect great quantities of rain and spring water, from the sides of the hills that slope towards the adjoining valleys, and through which it would otherwise escape. Both these methods we saw successfully practised about the year 1796, for increasing the supply to the new water-meadows which the late *Duke of Bedford* had directed his agent to construct near Woburn. A parallel valley, which crosses the turnpike road at about $43\frac{1}{8}$ miles from London, has its stream of water diverted at that point, and through a short tunnel into the Woburn vale, which it otherwise would not have reached for a mile or more, and at a much lower level. From the lowest point in the ridge of high land that separates the Woburn vale from one that proceeds through Pottsgrove parish towards Leighton, a trench or feeder was begun, and carried for a mile or more along the side of the hill in Pottsgrove, by which the rain water of 3 or 400 acres of land was brought into a reservoir in a branch of the Woburn vale, to be reserved for use.

The engineer, who has well considered and ascertained all the circumstances of the vales in or near to which his reservoir is to be constructed, will be able, by help of a number of levels, carried round to where the surface of the water will extend at every 5, 10, 15, 20, &c. feet in depth, or oftener, if the nature of the ground requires it, to calculate to what height the head of the intended reservoir must be embanked to retain all the water that his vallies can supply, between the times that it is fed by rains and springs, and required to be let off to the canal or mills, or such quantity only as it may be necessary so to retain, according to the principles before laid down.

The necessary height of the head or embankment for a reservoir being determined, the next step will be to examine minutely the nature of the strata and soil that are to be covered with water, and whether the whole or any part of the same is so porous as to require lining with puddle, as also the nature of the stuff which is to be used in forming the head or bank, as thereon will depend, in a great measure, the degree of slope which the banks ought to have; $1\frac{1}{2}$ to 2 feet base to one in height seems the usual slope; but if the soil should prove a slippery clay, as at the Aldenham reservoir, belonging to the *Grand Junction* canal, a greater slope should be given, as well as the precaution taken, of putting in frequent layers of sand or coarse gravel, to lessen the tendency of such soil to slip. If the reservoir will require bottom lining, yet still it will not sometimes be right to trust to lining for the head of the reservoir, but to carry up a puddle-ditch in the centre of the head, because if the inside of the head should happen to slip, the lining would be broken and disturbed. The slopes being settled, it will be right to make a cross section of the valley at the place of the centre of the head, as A C B (*Plate I. Canals, fig. 16.*) and to determine by levelling, and mark out the places of, as many perpendiculars or equidistant ordinates a, b, c, &c. as the width of the head and the nature of the sides of the hills A C and

C B may require; we are next to consider, that the section of the intended bank at every one of the points *a, b, c, &c.* will be nearly triangular, as D G F, *fig. 17.* (except wanting a small triangle G H I at top) K E being equal to the ordinate *a, b, c, &c.* in every case; the base D F, or width of the head at the different places, varying according to the height K E, and according to the inclination or fall of the ground D F, compared with the horizontal lines F L and I H. A theorem for E D and E F will readily be obtained with the above data, and these distances being calculated and laid off on the ground, so many points for the bottom of the slopes will be determined, and a careful workman will find no difficulty, by pegging down his line and holding his grating-tool in the inclining position H D and I F, (as before mentioned respecting marking out the canal) to mark out a lock-spit, as a boundary or base for the intended embankment.

If the several triangular sections D G F are taken near enough to each other, A *a, ab, bc, &c.* and are carefully calculated (for which purpose in very large works, tables framed from the theorem will be found the readiest way), by deducting a triangular prism, whose base is H G I, and length A B, *figs. 16 and 17,* the solid contents of the required bank will be very exactly obtained; and the most eligible spots for obtaining that quantity of stuff, as near as may be, without endangering the slipping or stability of the bank, may be marked out; and the work will then be in a state to be let to the contractors who are to execute it. But before this is begun, it will be necessary to provide for the escape of the surplus water when the reservoir shall be full, as also for letting out the water for use; for these purposes an arch of brick-work, or of stone, may be begun at the lower limit of the bank in the lowest ground or brook course, as at D, in *fig. 18,* and continuing the same on a level to a point M, some distance within the head D H I E of the reservoir; D' L' being the lowest ground or longitudinal section of the valley. This arch should be high enough for a plank to be supported and fixed on irons or bearers across it, about a foot from its bottom, on which a man can conveniently walk along; and, for this purpose, the arch had better be made elliptical, or higher than it is wide; a secure iron gate should also be provided, to be kept locked at a few yards into the arch from D, for excluding improper persons. At the termination of the level arch at M, there should be a circular well of 6 or 8 feet diameter more or less, according to the greatness of the floods that may be expected, to be sunk 6 or 7 feet deeper than the arch D M; its bottom should be formed either of one very large flat stone, or of a few well jointed ones laid on a course of puddle, and on this the steining of the well should be begun, with bricks of the very best quality, well keyed up and embedded in cement; and having a course of puddle of 9 inches or a foot thick, worked all round behind them, allowing the same to set as the work advances in height; this well, and the arch D M, are to be securely groined into each other at M; near to this groin, or within reach of a man standing on the end of the plank above mentioned, which should not advance quite up to the well, should be a large brass cock worked into the walling; the mouth of this cock should be turned down, so as to discharge its stream of water exactly in the direction for the centre of the bottom of the well; and from the cock should proceed a large pipe of lead or cast iron behind the wall of the well at some distance, for which purpose it will require a considerable bend, and this pipe should proceed, soundly embedded in good puddle, towards a convenient place as S, in the bottom of the reservoir, where it should terminate under a large and stout box full of

holes, or a fine grating, to prevent the entrance of fish or any thing that might choak the pipe or cock. In constructing the arch before mentioned, after it has proceeded from D as far as the intended puddle-ditch *cd*; the puddle-ditch should be dug out for some distance on each side across the arch; the same should be continued down to water-tight stuff, or at least for some depth into other matter, if unfortunately such is not within reach; and, when the puddle is carried up and set, as also a course of puddle in the bottom of the arch course *d M*, which should have been dug deeper for such purpose; the bottom of the remainder *d M* of the arch should be carefully laid on the puddle, and a centering for the arch is to be laid on the same and firmly secured down; this precaution being necessary to prevent the semifluid puddle that is to be applied successively without the arch, as it is carried up, from floating or burying up the centering along with the lower part of the arch. The work is thus to proceed until the part of the arch *d M* is completed, and inclosed completely in a case of good puddle, thoroughly and completely joined at one end into the puddle-ditch *a c f b*, and into the puddle that surrounds the well N M at the other. When the well-steining has been carried up to M, it will be necessary to increase the thickness of the puddle-wall round it, to three feet or more, taking care that the extra width is firmly bedded upon undisturbed and solid earth. The well is intended to be carried up in the same manner, surrounded by puddle, and by a conical embankment of earth O P Q R, to within two feet of the height of the bank H I, leaving a channel of several yards wide, and of considerable depth, I O P, between it and the bank or head D H I E. It will be necessary for the engineer to calculate and mark out the base of this conical embankment upon the ground, with allowance for ample slopes to prevent slipping or its washing down by the waves: it will also be proper, for ensuring stability to the work, to reduce the whole of the top of the work to one level as K L, as soon as can be, by successive layers of stuff thereon, and of puddle in the ditch *a c f b*, and round the well N M: and, if the bottom of the reservoir will require lining, owing to the porosity of the soil; it will be right, after levelling and treading the part *b R* perfectly, to cover the same with 3 or 4 courses or linings of puddle, joining the same perfectly with the puddle-ditch, and the puddle round the well, to which courses of puddle the bottom lining is afterwards to be carefully joined; and after this is properly set, the remainder of the bank L H I E, and of the cone O P Q R, may be proceeded with, as we have before mentioned, when treating of the rearing of canal banks with puddle-ditches in them. The bank or head being completed to H I, and the well N M, and conical embankment O P Q R, being also carried up to the proper height, the well should then be coped with a layer of the best hewn stones cramped together, and the top reduced to a perfect level; and for security, it will be right to pave the surface of the top P Q, and for some distance down the sides of the conical embankment, with paving stones pretty well jointed, and set their longest way into the soil, filling their joints with mould, and sowing grass-seeds therein, to prevent the waves from afterwards loosening the stones or wearing the bank; this conical bank is for enabling the water to fall into the well on all sides; if the well was made in a corner of the reservoir, much digging would be required, both for the arch or pipe to let out the water, and for the discharging arch D M.

We have been thus particular in describing the circular weir or well-fall above recommended, from having seen the beneficial effects of one, in the reservoir for Worley mills near

near the duke of *Bridgewater's* canal; and the mischief that is sometimes done to the banks of a reservoir and the adjoining lands, by letting off the flood-waters by common weirs or tumbling bays at the corners of the reservoir, and suffering it to find or rather tear its own way down into the valley. Reservoirs constructed on the above principles would be secure almost from accident, however high the embankment, or sudden and copious the floods, if the well is but made sufficiently large, and deep of water at the bottom, to receive the shock of the descending column of water. If the floods are so considerable as to bring down timber and other large floating matters, it will be necessary to fix a strong grating or circle of bars round the top edge of the well bank PQ. It will sometimes happen, that a reservoir is over or near to the navigable tunnel of a canal, and might be let down into the same by a pipe and cock as at Ripley on the *Cromford*, and near Braunton on the *Grand Junction*. It will be proper, that the core or plug of the cock to a reservoir should be turned by an endless screw, or by toothed wheels, so that considerable power and nicety in the adjustment of the stream let out, by the turning of the cock, may be attained; and a register should be provided of the number of turns, and fractions of a turn, that is given to the winch or handle in any case. It will be proper to flanch on a small pipe to the large one, and connect the same with an inverted glass syphon filled with mercury, in the arch near the well, so that by turning a cock, the height of the mercury should indicate on a scale attached, what depth of water there is in the reservoir above, or how much it wants of being full at the time. A series of accurate experiments should be made, by gauging the stream of water at D, or at the first convenient place below it, which the cock discharges per hour or day, when the water is at different heights in the reservoir, and with different turns of the cock-geer; these should all be repeated, and sufficiently numerous, to enable the engineer by interpolation, to fill up and form a table, (that the committee ought carefully to preserve copies of) by which at any given height of mercury, the cock can readily be set to discharge any number of locks full of water that may be required per day. No great difficulty would attend the forming of a gauge-puddle, instead of, or by the side of the brass cock that should regulate itself, and discharge any regular and constant quantity of water that the reservoir could supply: see *Leybourn's Repository*, 8vo. question 81, p. 165. It will be right also for the engineer and committee, to have tables for readily shewing the quantity of water that every reservoir contains, at each foot or shorter portion of its depth, indicated by the mercury in the syphon, or by a graduated gauge-post fixed up in any part; for forming a table of this sort, where a complete survey had not been made or preserved at first, the time of a hard frost should be chosen, and a sufficient number of holes at equal distances, in a great number of parallel or equidistant lines, should be bored or cut through the ice sufficiently large to let down a plummet to sound the depth, and if this is done with care when the reservoir is full or nearly so, a most correct table of its content at different depths, can be thus obtained by calculation. Some of the considerable reservoirs that have been constructed for canals are, at Aldenham, Daventry, and Wilstone on the *Grand Junction*; Kilsyth on the *Forth and Clyde*; Branstone, and Denton on the *Grantham*; Ripley on the *Cromford*; Amsworth on the *Nottingham*; Littleborough on the *Rochdale*; Marldon on the *Huddersfield*; Oxendon on *Leicestershire and Northamptonshire Union*; in Rudyerd vale near Leek, for supplying the Caldor branch of the *Trent and Mersey* canal, which covers 160 acres, has its head 30 feet high,

and the water in general very deep. St. Ferriol reservoir, constructed about the year 1670, on the canal of *Languedoc* in the south of France, occupies a space of 595 acres, its banks are walled round with free stone, and its waters let out when wanted, by a large pipe and cock.

In constructing *Feeders* or channels to convey water to a canal from springs, brooks, or reservoirs above its level, the same care must be taken to examine the nature of the soil in every part, and to apply a lining of puddle, as have before been mentioned respecting the line of a canal, wherever porous stuff is to be cut through. Where there are a great number of undulations in the ground, through which a feeder is to be conducted, that would occasion it to be very crooked and much impede the cultivation of the land, it will be proper, in many instances, especially if the land be valuable, to cover over the feeder in a culvert or small arch of bricks, of 18 inches or 2 feet diameter, or larger if the supply shall at any time require the same: in very porous soils, these culverts, inclosed in puddle, will be the most effectual way of preserving and conducting small streams of water, and no land will thus be lost to cultivation. In some places, feeders will require considerable embankments and aqueducts, to cross valleys and streams of water, and preserve their level, or gradual and small fall; and in many of such cases it will be cheaper and better to use cast iron-pipes well jointed and flanchd, and laid within the ground, down one side or bank of the vale to be passed, and up the other, securing each end carefully with a strong box full of holes, or a fine grating to keep extraneous matters out of the pipe. In the case of smaller feeders, particularly those temporary ones, which are required to supply water to puddle with, and to fill the bottom of the canal for the temporary use of dirt-boats while making it, as before mentioned, elm-pipes in short lengths, in which the most crooked arms of large trees will come into use, may be advantageously used in crossing hollow roads, or other sudden ravines, if the same be jointed by short hollow double cones of cast iron as recommended by Mr. *Hornblower*: see *Repository*, vol. x. p. 25. It has often happened, where reservoirs are situate at some distance above a canal, and a brook-course led from the reservoir to the canal, that the water was left to take its ancient course on being let out of the reservoir; an expert engineer will, however, carefully examine all such feeders, for thus they ought to be considered, and fill up all deep holes, and lower the shallows in the brook-course, so as to reduce the channel nearly to an uniform width and depth; and very accurate gauges of the water ought to be made at different seasons of the year, of the quantity issuing out of the reservoir arch, and the quantity received into the canal; if these differ materially, intermediate and comparative gauges should be made of the stream, until the faulty or leaky ground is discovered, probably some stratum of sand or open-jointed rock; over which the brook-course or feeder ought to be carefully lined with puddle; and, if puddling-stuff be scarce, the soil very porous, and the brook-course very crooked, it may be the most effectual way, as well as the cheapest in the end, to pass such leaky ground by a small culvert, inclosed in puddle under ground, by the side of the brook-course, as straight as the course of the valley will admit. Except in situations, where mills in the vicinity of an intended canal are much in want of water, or their owners or others disposed to thwart the scheme, it has been usual to allow the company to search for, and divert to their use all springs of water, within certain limits on each side of their line; in the acts for the *Newcastle underline Junction*, the *Southampton and Salisbury*, and the upper part of the *Tamer Manure* canals, this limit is fixed at 1000 yards; in the *Aberdeen, Polbrook,*

Tamar Manure lower part, *Thames and Medway*, *Wilts and Berks*, and others, this is fixed at 2000 yards on each side of the line. In such cases, an accurate investigation and knowledge of the *Strata*, upon Mr. *Smith's* principles, will be of the most essential importance, in order to collect and retain springs that are above the summit level, or even in lower situations, where a local trade is to be provided for. It has been usual in some mining districts to require, that engines near an intended canal should lift their mine-water into such canal, or high enough to be conducted into it by a feeder, as on the *Birmingham and Fazeley* canal. It will be worth considering, on a summit, where water is scarce, whether a tunnel may not be more eligible than deep-cutting, on account of large springs which would be intersected by the lower level of the former, when the deep-cutting must perhaps be in porous stuff, or perhaps in dry open rock. As the summit pounds or levels of most canals are in deep-cutting, through a considerable portion of their lengths, it is often attended with but little additional expence, except in the case of tunnels, to make such summits pounds one or two feet deeper in water than usual, as on the *Derby, Cromford, Manchester Ashton and Oldham, Oxford*, and other canals, in order that such additional depth, being filled in winter-time or wet seasons, may act as a reservoir for drier ones; but it has not always been considered, that such deeper pounds, when filled 18 inches or 2 feet fuller than is necessary, occasion the necessity of letting off twice that extra depth of water, over the area of a lock, each time that a vessel passes the summit; by which, such reserve of water is in a great measure dissipated before the dry season for which it was intended arrives. We should recommend, either the use of reservoirs, so much above the summit level of the canal, that they could be emptied into the same, when the continuance of dry weather required it; or, if such deeper summit pounds be made, on account of their considerable length for holding water, that a lock capable of penning 18 inches or 2 feet, and of shutting very tight, should in such case be built, near each end of the summit, to be used as long as the summit water is higher than usual, but which might at other times be left open, when the water was level on each side of them. Before we quit the subject of supplying a canal with water, we beg to mention, that it may be worth the while of the engineer, where water is to be pumped up to supply the lockage, as we have before mentioned, to design and calculate the expence of wind-machines, capable of doing the required work, and of the probable expence of their repair; and to compare the same, with the cost of erection, expence in fuel, attendance and repairs, of well constructed steam-engines to do the same work.

On the *erection of Aqueducts* for conveying a canal over any very deep and wide valley, or over a large or navigable river, we beg to mention, that a most secure foundation must be sought for, by sinking, or obtained by piling, for the piers of an aqueduct-bridge, and that the arches ought, in every case, to be arches of *equilibrium*, because the least settling in brick or stone bridges, by letting through the water, may prove of the most fatal consequence. That the plan of an aqueduct-bridge should be curving inwards, that is, the ends should be wider than the middle, the walls should also not be upright, but butting or diminishing upwards with-outside, to give greater strength and stability to the whole; the materials, if of stone or brick, and the cement, should be of the very best quality, and the work executed in the summer season only. In *Plate II. Canals*, *figs. 19, 20, and 21*, we have given a plan, section, and elevation of an aqueduct-

bridge, proper for crossing a considerable river, where, in *fig. 19*, A is the river, B the canal, C the towing-path, and DD the wing-walls, for keeping up the embankments at each end of the bridge: in *fig. 20*, C is the towing path, and *aa* a lining of puddle to secure the canal B from leaking. Care should be taken that all the joints of brick or stone are worked as close as possible in an aqueduct-bridge, and thoroughly filled with cement; the slopes within side, and the bottom for the canal, should be made rough, that the puddle may the better adhere to them, and that the puddle may not slip, owing to the steepness of the sides, which must be more so than in other parts of the canal, to avoid unnecessary expence of masonry or brick-work in the width of the bridge. The lining as above is, however, liable to be soon cut away by the barges. Since the year 1795, a new kind of aqueducts has been introduced into this country, composed partly of cast-iron, which promises the greatest advantages, except, perhaps, where free-stone of an excellent and durable quality is found upon or very near to the spot, or where the same is very distant from any iron mines, or existing navigations that connect with such. In the year 1797, Mr. *Thomas Telford*, the engineer, wrote an account of the inland navigation of the county of Salop, which has since been printed in J. *Plymley's* Report to the Board of Agriculture, on the Agriculture of Shropshire, and we beg to extract therefrom what he says on this subject when speaking of the *Shrewsbury* canal, p. 299, as follows: "This canal passes over the valley of Tern, at Long, for a distance of 62 yards, upon an aqueduct made all of cast iron, excepting only the nuts and screws, which are of wrought iron; and I believe this to be the first aqueduct for the purposes of a navigable canal which has ever been composed with this metal. It has completely answered the intention, although it was foretold by some, that the effects of the different degrees of heat and cold would be such as to cause expansion and contraction of the metal, which not being equal to extend or draw back the whole mass of the aqueduct, would operate upon the separate plates of iron so as to tear off the flanches which connect the plates lengthwise, and break the joints. Others said, that the expansion of freezing water would burst the sides, and so break off the flanches which connect the sides with the bottom plates: but after the trial of a summer heat, and the very severe frost of the winter of 1796, no visible alteration has taken place, and no water passes through any of the side or bottom joints. After the frost had continued very severe for three or four days, and the water had not been drawn off (although there are means of doing so), but it had stood in the aqueduct above the height of two feet six inches, the ice had then frozen to the thickness of an inch and a half, but instead of having forced out the sides, it was melted away from them, and quite loose upon the surface of the water. The idea of having this aqueduct made of cast iron was first suggested and recommended by *Thomas Eytton* esq. then chairman of the committee: after due consideration, it was approved by the committee, and the principles of construction, and the manner in which it should be executed were referred to Mr. *William Reynolds*, and the writer of this article, (Mr. *Telford*) who, after several consultations, and forming and considering various plans, at last determined upon that which is represented by the annexed engraving, (*Plate III. Canals*, *fig. 22*.)

"The castings for the aqueduct were done at Ketley, and were removed to Long, a distance of five miles, partly by land and partly by water-carriage. This aqueduct was proposed in consequence of the great floods which happened in the beginning of the year 1795, and it was fixed up complete
in

in March 1796." Mr. Robert Fulton, an American engineer, who happened to be in this country at the time, seems to have availed himself of what was going on at Long aqueduct as above, and of the machinery of various kinds, in use upon the *Ketley* and *Shropshire* canals, and to have prepared drawings and models of a variety of such machinery, with many improvements of his own, and submitted the same to the examination of a committee of the Board of Agriculture, in March 1796. These have since been published in a handsome quarto volume, entitled, *A Treatise on the Improvement of Canal Navigation*, by R. Fulton, from which, p. 114, we beg to extract what he says on constructing aqueducts of cast-iron for a narrow canal as follows: "The buttments and piers being raised, it will only be necessary to extend two pieces of timber across the span; each to be braced back to the piers, and covered with plank to form a stage or scaffolding which will answer every purpose of centres necessary to works of stone. The iron-work, as in the section (Plate III. Canals, fig. 23 and 24.) may all be cast in open sand, and of the following dimensions: supposing the span 100 feet and the spring one-sixth of the span. First, three segments of a circle, each in three pieces, about 36 feet long, eight inches by four diameter, to be united, as at A. Second, three straight bars, to extend from one pier to the other, to be of the above diameters, may also be cast in three pieces, which bars are to extend along the top of the segments to the piers, and form a line parallel to the horizon; the bars and segments to be united by perpendicular stirrups like B, ten or fifteen feet distant from each other. The mortice in the lower end of the stirrup being thirteen inches long, will be sufficient to secure the segment, and leave room for a hole two inches square, through which a cross brace, C, is to pass, and fasten the segments at proper distances; the brace to have a mortice, cast on each side of the stirrup, in order to tighten the work by wedges. On the top of the stirrup, the square hole to receive the cross brace may be beneath the mortices, as in the figure; by which means the whole may be combined, and form an iron stage to support the troughs. The trough plates should be at least one inch thick, the side plates six feet broad, and as great a length as can conveniently be cast; which may be performed twelve feet, and perhaps more in length: the flange to be outside on these plates. The bottom plates may be six feet wide, thirteen feet long, seven feet plate, and four arms projecting, each three feet long, in order to support the horse-path and braces, as exhibited at D. Two of these plates laid across the stage, and screwed together, with a flange under, will compose a length equal to one of the side plates, which may either meet or break joint as is thought proper. The whole may, in this manner, be screwed together, on packing of wool and tar, and have the seams pitched like those of a ship. On the plates composing one side of the trough, small brackets, about three feet from the top, must be cast, as at E, in order to support the horse-path; perpendicular rails, eight feet long, being raised from the arms of the bottom plates, will support the outside of the horse-path, also the iron railing, as in the section. By this mode, two patterns will answer for the whole of the trough-plates, and but few will be required for the springs, rails, and spurs; while the saving in time and expence will be considerable; particularly where it is necessary to bring the stone by long land carriage; for the arches being dispensed with, and the piers not more than one third of the dimensions necessary to an aqueduct of stone, will most materially reduce the quantity of masonry." "In aqueducts of stone, one of the great difficulties is to line and puddle so tight as to prevent the water penetrating into and injuring the masonry; but in one of

iron, should a leak take place it will instantly appear; and on shutting the stop-gates at each end, and discharging the water, it may be stopped in a few hours, if not minutes: this circumstance in aqueducts is, perhaps, one of the greatest preservatives; they are consequently less liable to injury, and only subject to the corroding tooth of time."

Since the above period, a most stupendous work of this kind has been undertaken by Mr. Jessop, on the *Ellesmere* canal, and is now nearly or quite completed, for crossing the *Dee* river at Pontcysyltee, about 20 miles S.W. of Chester; where nineteen massive conical pillars of stone, at fifty-two feet from each other, the middlemost of which is no less than 126 feet in height, support between the top of every pair, a number of elliptical cast-iron ribs, which by means of uprights and horizontal bars, support a cast-iron aqueduct about 329 yards long, 20 feet wide, and six in depth, composed of massive sheets of cast-iron, cemented and riveted together, having on its south side an iron platform and railing for the towing-path. In May 1796 Mr. James Jordan took out a patent for suspending aqueducts from ribs of cast-iron above them, in the same manner as his suspended iron bridges. See *Repertory*, vol. vi. p. 230. Among the most considerable aqueducts of stone or brick are those at Lancaster on the *Lancaster* canal, for a description of which see our article BRIDGE. At Kirkintollueh and at Kelvin on the *Forth and Clyde*, Chirk on the *Ellesmere*, Marple on the *Manchester Ashton and Oldham*, Monk-bridge on the *Trent and Mersey*, Whaley-bridge on the *Peak Forest*, Avoncliff and Dundas on the *Kennet and Avon*, &c. while at Burton on *Bridgewater's*, a navigable river is passed, and near Wigan on the *Leeds and Liverpool*, another canal (the *Lancaster*) is passed upon aqueducts. It was thought a bold and visionary scheme by many, which Mr. James Brindley proposed, of crossing the *Mersey* river at Runcorn Gap, by an aqueduct bridge, but no doubt he could have accomplished it.

The making of Embankments appears to have been long practised in China, where we read of parts of their canals of 200 feet wide, that are embanked 20 feet high, for great lengths together; the rivers through the fens of Cambridge and Lincolnshire in this country, have also been long confined thus, by artificial banks. Most of the aqueducts of which we have been speaking above, have less or greater lengths of solid mounds or embankments for forming the canal upon, to the proper height, and for joining them to the aqueduct bridges; all the observations and remarks which we have made, respecting the setting out and ascertaining the dimensions of the head of a reservoir, will apply to embankments; except that a prism whose base is the figure G H L M N O I, Plate IV. of Canals, fig. 25, and length A B, fig. 16. Plate I. is to be deducted from the triangular embankment D G F, first to be calculated, instead of the triangular prism G H I. The angle of the slopes ought to be determined by the result of similar inquiries, and the same precautions used to prevent slips, in soils that are so disposed, as were mentioned respecting reservoir heads; it will generally be a safer way to carry up a puddle-ditch in each bank of the canal, as *a e, b f*, fig. 25, than to trust only to lining of the canal L M N O. In every considerable embankment there will be required one or more arches to convey a brook or river under the canal, and, perhaps, others for roads to pass through; such arches should always have an inverted arch turned below them, deep enough for the bottom of the brook, and below the roads, and the arch itself should be one of *equilibration*. To avoid making a very large arch for a brook or small river, it is usual to make a road or communication arch near it, with its

its bottom well paved, and no higher than the surface of the meadows, which will serve to vent the sudden flood in rainy seasons.

Great care should be taken to slope off and finish the ends of arches under an embankment, agreeable to the slopes or sides of the banks thereof; by which the banks are prevented from mouldering down into the brook or road-way, and awkward projections in the slopes of the banks are avoided: at the entrance or upper side of a water-arch, or of road-arches that will occasionally become such, return or wing-walls of brick-work or stone should be made, for some distance along the bottom of the slope of the embankment, and the sharp corners of the entrance of the arch should be a little rounded off, to prevent the rapidity of sudden floods from wearing or injuring the bank. It is to be observed, in conducting a canal along the side of a steep and high hill, as *Plate I. fig. 3*, that after a certain degree of steepness of the ground A' P', it will not be possible to cut the canal, upon the principle that the excavation EFGIKP shall just form the bank ABCE, but such banks will often require stuff to be provided from other places, and such are indeed cases of embankment: and here it may be proper to advise, that new banks, as ABCE, ought not to be placed on very steep ground, as AE, without considerable care in first forming it into levels like steps, to prevent the slipping of the new part, as happened near Bradford on the *Kennet and Avon* canal, after all the care that was taken, and great lengths of the canal banks slid down into the *Avon* river below, the making of which good again cost, we were told, near 1000l. Among the considerable embankments that have been made for canals, are those at Bollin and Stretford on *Bridgewater's*, and Wolverton, Weedon, and Bugbrook on the *Grand Junction*, &c. but the greatest extent of high embankment known, is that in the valley of the Boyne, in the *Grand* canal of Ireland; and the highest bank in the world is also to be found on the same canal in the valley of the River Rye; it is above 90 feet high. We are told, that Mr. James Brindley used a kind of caisson of planks, in forming his great embankments, in which dirt boats were used, to bring stuff from the higher ground, that had been cut through.

We have next to speak of *Safety-gates*, *Stop-gates*, and *Stop-planks*, which are different contrivances for stopping the water of a canal in case the banks are failing in any part, or that any part wants emptying to repair the works. Advantage is generally taken of the walls under the bridges, for constructing these contrivances, where the same happen in the proper places; otherwise the canal must be contracted by upright walls, the same as is done at the bridges on purpose for them. For explaining the nature of safety-gates, we must have recourse to *fig. 26*, where AB is supposed to represent the top of the wall, or height of the towing-path under a bridge, CD the surface of the water, and QS the bottom of the canal; EFGH is a pier of hewn stones, or a piece of sound oak timber let into the wall, its face being flush therewith; IEG and HFK are recesses about two inches deep in the wall; similar provision is made in the opposite wall, for receiving doors or gates LM and NO across the canal, turning on centres or hollow-quoins at M and N: each gate is so balanced by a counter weight, that they rest always in the position represented: and they are intended to operate thus, suppose, owing to the sudden breaking of a bank, the water in the canal should acquire a current from Q towards S, the stream would pass under the gate at P L, to facilitate which, the corner of the floor at P is sloped off; the gate would be turned up into the position ME, and the canal would be thereby closed up. The like would happen by the other gate NO, in case of a current the con-

trary way. Safety-gates should be placed at proper distances on every long level or pond of water, especially if the same is much embanked; both to prevent the loss of so much water, in case of a bank breaking, and the mischief that the same would do to the lands, mills, &c. below the breach. We read of a new bank breaking on the *Warwick and Birmingham* canal, and destroying a gentleman's park-walls; and in the year 1783 so great a breach suddenly happened on *Bridgewater's* canal, near London bridge on the Chester road, that three barges were carried through the same a great way out into the fields. A single safety-gate ought to be placed at the end of every long embankment, to stop the water in case of a breach happening in its banks. *Stop-gates* are similar in their construction to the safety-gates above described, except that the gate lies flat on the bottom of the canal instead of being balanced, and has a chain by which it can be hauled up, whenever occasion may require the canal to be stopped. *Stop-planks* are a simple, though not so expeditious a provision for stopping a canal as the last; a groove is provided in the two opposite walls under a bridge, or in a narrow and walled place, and a sufficient number of well jointed planks are provided, to be dropped into the groove whenever the water is required to be stopped, and hence these are often called drop-planks. In very large works like the *London docks*, a barge or vessel is built in the place, whose head and stern posts exactly fit into a groove as above, and the vessel can be floated into and out of its place, or sunk therein as occasion may require. The engineer will also have to make provision, while the canal is digging, for *stop-bars* at the several intended toll-houses, or other places where it may be necessary to stop barges in the night, or in case of any dispute about their lading: these bars are composed of a large baulk of fir timber floating on the water; and a small arch capable of containing such a floating beam of the proper length is provided under the bank, so that when the trade on the canal is required to be stopped, the toll-clerk has only to draw out the beam by means of a cord attached to it, until its end enters a recess in the opposite wall, and then to lock the beam fast.

We shall next describe the *Waste-gates*, *Trunks*, *Tumbling-bays*, or *Weirs*, that must be provided, for letting off the surplus water of a canal in wet times, for keeping the water to one certain height, or drawing it off in case any repairs may be wanting. *Waste-gates* are sluices of the common construction in the side of a canal, where any considerable quantity of water is required to be let out, and are to be drawn up, either by a rack and pinion, a chain and roller, or a number of holes for a crow-bar, as circumstances may render most eligible: where lesser quantities of water are to be let out, or for emptying certain lengths of the canal between the stop-gates or planks, when occasion may require; *trunks* formed of oak or elm planks, well jointed, should be laid into the bank, at the bottom of the canal, and carefully inclosed in puddle, with a valve or shuttle that will shut very tight, and can be readily drawn when the water is required to be let off: we beg to recommend, wherever wooden trunks are used for any such purpose, that they should be sunk so low, or the mouth where they discharge should be made up, so that the trunk may always remain quite full of water, and the air be at all times excluded; in which situation wood will last much longer than if wet and dry alternately.

In the choice of situations for *weirs*, to discharge the surplus water of a canal, care must be taken not to let off any considerable quantity at any time, but into a brook-course or bottom of a vale, that is crossed or proceeds up to the canal, and has ditches through which the water can escape, without

without tearing or doing injury to the land adjoining. The most frequent *tumbling-bays* or *weirs* to discharge water from canals are composed of strong walls of brick or masonry, as *q c*, Plate IV, *Canals*, fig. 27, whose top *q* is coped with hewn and well jointed stone, or with a stout sill of oak, the top of the same being just level with the top-water line *q D H*, or about one foot lower than the top-bank *D C I K*, *A c* is a paving of large stones for the water to fall on, and escape at *A*, and *A B c* are wing-walls at the ends of the weir, to keep up the bank and confine the water. These weirs are generally on the towing-path side, on which a low plank bridge, as *C l*, is supported over it, called a weir-bridge. When these weirs are wanted of considerable length, the wall *q c* ought not to be straight but on a circular plan, curving inwards in the middle, by which it will be better able to support the lateral pressure of the bank behind it; a puddle ditch should be carried up immediately behind the wall, allowing the courses of puddle to set thoroughly, before others are applied, that the great pressure of the semifluid puddle may not overset or disturb the wall; and the paving *AC* should be of large and well jointed stones, and if set upon a course of puddle it would be a further security against their washing up, which too often happens. We have seldom seen any considerable weirs or tumbling-bays of the above construction, but where it would have been better to have followed the example of Mr. *James Brindley*, on *Bridgewater's* canal, and have made a *circular-weir*, or well-fall, on the upper side of the canal; we have spoken of these when treating of the general improvement of a valley, as also in the making of reservoirs, but it may be proper here to refer to a section of such a well fall in fig. 28, where *A' P'* is supposed to be the section of a vale crossing the canal *C F G I*; *AM* is an arch of brick-work, secured on its upper side at least, with a covering of puddle, and *MN* is a well, whose steining or lining of brick or stone is groined into the arch at *M*, having a well paved floor, three or four feet below *M*, according to the height *NM* that the water is to fall, and a coping of hewn stone, or a large curb of sound oak at its top. *I O P Q R P'* is intended to represent the section of a side pond or wider place in the canal, from which the water may drop quietly into the well at *N* from all sides, and run off at *A*.

For letting a proper quantity of the surplus water of a canal forwards into the ponds below, a small weir is generally constructed in the walls at the head of each lock, which lets the water down into the paddle-holes, or crooked arches that convey the water for filling the locks, and hence such are called *paddle-weirs* or *lock-weirs*. The upper gates or doors of the locks are often boarded no higher than the top-water line, and therefore act as weirs for discharging surplus water into the lock; and gates of this sort are called *flood-gates*.

On the *construction of Culverts*, or drains under a canal for conveying away water from the upper to the lower side of the canal, it remains for us to say, that they should be carefully apportioned in size to the stream that is to pass through them in floods, and should be constructed of sound brick or stone work, and inclosed, or at least well covered on their upper side with puddle. Many engineers have used wooden trunks for this purpose, but except wood be in great plenty, and of the best quality, and good bricks or stone very difficult to be procured, it is not advisable to use perishable materials in such situations. If the ground be moory or bad, and a culvert must lie pretty near to the bottom of the canal, and have but a slight covering, it may be proper, in some situations, to use cast-iron cylinders flanced together, as was done under or near the *Staffordshire and Worcester* canal;

and such may be made cheaper and easier of carriage, by being in two or three segments longitudinally, to be flanced together before they are laid down; and in such situations, perhaps leaden rivets might be cheaper and be more durable than wrought iron ones, or nuts and screws. If bricks are to be used in culverts, over soft and moory ground, or quick-sands, a cradle composed of ribs of wood and boards or rails, such as are used for centering, should be prepared, suitable to the outer curve of the intended culvert, and such a cradle should be carefully embedded, in the proper place to receive the bricks of the lower segments of the culvert: for want of such precaution many a culvert has sunk partially, perhaps owing to the springs excavating the sand or silt from below, and has been broken, to the great injury of the canal. Culverts are of so much importance, that too much care can hardly be taken to make them solid and secure, and to cover them effectually with puddle: another hint we would here give, respecting the choice of places for the culverts; they should never, if possible to avoid it, be made exactly in an old brook-course, ditch, or slough, but in the nearest found ground; and where often they can be got down to the proper depth, without any trouble from water, or at least the same can be easily pumped out; and the stream need not be admitted to the work, until the old brook or slough is required to be filled up. In this way it often will happen, that culverts may remain during the winter following their construction, completely excluded from the frost, and therefore may be done later in the year, by filling in the stuff upon them and at their ends, and the mortar be completely set before the new channel at the ends for conducting the water through them need to be cut. And we beg to remark, that by an attention to this circumstance in making new arches under roads, and keeping the bottom of the arch much lower than is generally done, or indeed practicable in the old channel or slough, half or two-thirds of the whole expence will generally be saved; for a deep and new channel being cut to the new arch; with scouring out the brook-course for some distance below, old ford-places, if the descent to them be easy and convenient, will not require immediately to be filled up or altered; but during any extraordinary flood, the same, if composed of gravel and hard stuff, may act the part of a weir for a short time, in carrying off the water, without injury to the road or material inconvenience to the passengers. It will sometimes happen, that a small stream of water is required to pass under the canal, in places where it is not embanked; in such cases a crooked or *broken-backed culvert* is to be made, as *moon*, fig. 29, for passing the water from *m* to *n* under the canal *C F G I*; this will require puddling as before described, and a strong box full of holes, or grating, should be fixed over each of its ends, as well as pits or holes be made at the upper end, deeper than the mouth of the culvert, to receive and detain the sand and gravel which the stream may bring down in hasty rains, otherwise these, or the stones that mischievous boys might throw into it, would in time choke it up between *o* and *o*.

The *construction of Tunnels*, or subterraneous arches, for drawing off or conveying of water, has been known from the earliest periods, as appears by the celebrated works of this kind between lake Copais in Bœotia and the sea; between the lakes formed by the inundations of the Nile in Egypt and the Mediterranean; as also by the courses of the Roman aqueducts, many of which were tunnelled through hills of great extent. In the mining districts of this country, we have long had levels or audits of considerable extent to mines; in the neighbourhood of Matlock in Derbyshire, the *Helcar Sough* has been cut through the solid rock for nearly four miles.

miles in length, for the purpose of draining the several lead mines in the vicinity; *Wirksworth Moor Sough*, of near three miles long, and *Cromford Sough*, of two miles in length, with many others of less note, are also to be found at great depths in that neighbourhood. The first tunnel that we read of, as constructed for the purpose of navigation, was by M. Riquet, near Beziers on the *Languedoc* canal, in France; and the first in this country, was the entrance made by James Brindley to the duke of *Bridgewater's* coal-mines at *Worsley* near *Manchester*; while the first of our tunnels undertaken for the purposes of general trade, or as a thoroughfare, was by the same engineer at *Harecastle* on the *Trent and Mersey* canal. It is very essential to the convenience as well as the beauty of a tunnel, that the arch thereof should be quite straight, and exactly level; considerable care will therefore be necessary in obtaining an exact section, by levelling, of the hill that is to be perforated, when a line in the exact vertical plane of the tunnel is fixed and staked out over the hill; in doing which, it will be right to choose the narrowest place that the hill presents at the proposed level, and where also the hill rises rather boldly from such level; otherwise an expensive and troublesome length of deep-cutting would be necessary, or of the tunnel that must be dug out from above and then covered up again, before a sufficient depth of stuff overhead would be come at, to admit of working under ground; it will also be of consequence, when determining the exact line for a tunnel, to avoid having the deep-cutting and entrances in alluvial or disturbed and slippery soils, but, if possible, to enter at once upon the solid and undisturbed strata of which the hill is composed.

It will but very rarely happen, and that only on short tunnels, made for the purpose of preserving the level of a canal, that the workings will not be in soil more or less full of springs of water; therefore one of the first operations, after the line and level of a tunnel is finally determined on, is to search by levelling for a place in the nearest vale or brook that is some feet below the proposed level of the bottom of the tunnel; this must be more or less, according as the intended tunnel is of greater or less length; and from this point a large ditch must be opened, with a very small rise towards the end of the tunnel, as far as is practicable, and then a heading or sough must be begun, just large enough for men who are used to such business to work in, and to line it securely with bricks as they proceed, but leaving proper openings in the joints for the springs to collect freely from all sides into their heading. Some persons have supported their headings with boards and props of wood, instead of arching them; but which practice we cannot recommend: all such works ought to be durably constructed, or should any accident or circumstances, as the want of money, &c. delay the completion of the work for some years, all this tedious and expensive work will perhaps require doing again; it ought also to be considered, that after some years or ages have elapsed, the tunnel may want repairs or alterations, and that the same headings may be again opened and used, to lay it dry in a short time, if durably constructed; which may be of the most material consequence in lessening the period of interruption to the trade by such repairs or alterations. It will be necessary to begin a heading as above-mentioned on each side of the hill, and work them up towards each end of the tunnel, along the line of which it is to proceed from each end, rising gently as it advances towards the middle point, that the water may run freely off; the headings should be a few feet below the bottom of the working, that will be necessary for the inverted arch of the tunnel, and a few yards off on the side of it; and cross headings or soughs must, at stated distances, be run under the line of the tunnel, into which, openings can after-

wards be made to let off the water which collects in each separate working. If the soil be rather stiff, and the quantity of water in it not very considerable, one heading may suffice; but where porous stuff, with great quantities of water are intersected, it will be necessary to branch off an additional heading, to proceed along the other side of the line, the more effectually to draw off the water; by which, perhaps, if the headings are done a sufficient length of time before the tunneling is begun, a quick sand, or similar running of the stuff, may in several places be prevented. If in driving the headings, any fissures or cavities filled with sand or loose matters, are intersected, and are found to bring a considerable quantity of water from one side of the line, it may be right to drive a cross heading for some distance into such porous stuff, for intercepting the water before it reaches the intended workings of the tunnel.

The next operation will be to set out a line very truly parallel to the line of the intended tunnel, and to mark thereon, at equal distances, about 150 yards apart, or oftener if great expedition in completing the tunnel is required, the place of the several tunnel pits, that are to be sunk for drawing up the stuff excavated from the tunnel, and letting down the centres, bricks, and other things wanted in the work; it will be well to contrive the line of the headings and tunnel-pits, so that they may coincide; and in great lengths of heading shafts or tunnel-pits may be sunk at intervals, to give air to the headings, and through which the stuff excavated therefrom may more readily be drawn up; and it may be advisable, in some instances, to set out a line on each side of the tunnel, for the tunnel-pits to be some on one side and some on the other of the tunnel, and that both may in places intersect the headings. If bricks or stones are not at hand when the tunnel-pits are begun, and wood is plenty, the shafts or tunnel-pits may be made square, and have their sides supported by boards and struts of wood; otherwise they should be made round, and lined or steined like a well as soon as they are done; if the soil should prove loose and full of water, it will be necessary to stein the shaft as soon as such soil is reached, and to work afterwards from underneath the curb, and let the steining sink, as is done in well sinking. Some tunnel pits have been made over the line of the tunnel, but such do not admit of being steined with safety, on account of the weight thereof, which would damage the crown of the tunnel, where they were groined into each other; and such of them as are left afterwards for air shafts, if the soil is wet, will let an unpleasant dripping of water down upon the goods or passengers in passing through the tunnel, as we once experienced in passing through *Braunston* tunnel on the *Grand Junction* canal. A common roll and winch will be sufficient for drawing up the stuff and water, and letting down bricks to stein with, unless the quantity of water is considerable; but it will be proper to erect a horse gin, or turn beam, such as are used at the shafts of coal-pits, for the cheaper and more expeditious drawing up the stuff and letting down of materials, when the workings have commenced. We have before recommended a line to be staked out exactly parallel to the line of the tunnel for the centres of the several tunnel-pits, and care should be taken that no gin, or other obstruction, be erected in this line, so that a fine line or string can at any time be stretched across the top of any of the tunnel-pits, and be adjusted without fear of mistake in the exact range of this line, or parallel to the intended tunnel. When a tunnel-pit is completed and steined, and a communication formed with the heading to keep the same clear of water; two points must be fixed in the steining near its bottom, by letting fall or suspending plumb-lines, at the time that there is no wind to disturb their verticality, and adjusting another

another fine line between the two points on the steining below, so as to be exactly under and parallel to the line above and consequently so to the intended tunnel. The engineer should carefully repeat his levels and transfer the level of the bottom of the intended tunnel, or the surface of the water of the canal therein, and mark the same carefully in the steining of each tunnel-pit: and thus the workmen who are to undertake the work will be furnished with the direction, level, and distance of the tunnel they are to form under ground.

The work commences, by excavating a passage from the tunnel-pit into the line of the intended tunnel, and supporting the same properly with timber, or walls and an arch, as a passage into the work. A piece of the intended tunnel, a yard or more in length, according as the soil is found to stand, is then excavated, in the proper form, place, and level, ascertained from time to time by stretching a fine line between the marks, on the steining before-mentioned, and measuring therefrom, and using a common plummet-level for transferring the level from the level-mark on the steining before-mentioned; great numbers of ribs for centerings should be prepared in different segments, and in readiness to put together with nuts and screws, leaving as much room in the middle or centre as can conveniently be done, for the men to work and pass through after the same are put up; the parts of two of these ribs are then to be let down the tunnel-pit, and to be put together and fixed up in their proper place and distance asunder in the tunnel; short lengths of boards or laths are to be prepared and fixed on their outsides, as the turning of the arch proceeds; which, as well as every other part of this very difficult work, requires the utmost care and experience to make it sound and substantial; when this first yard or less in length of the tunnel is turned and securely keyed up, the same is secured by ramming in clay, or proper stuff, so as to fill every cavity above or withoutside the brick-work. The workmen then begin at each end of the piece that is turned, one party working one way along the line of the tunnel, and another the contrary way, until another yard or other length of the tunnel is excavated, when other ribs are put up and fixed together, boarded, and the brick-work is turned round or behind, the same as before; the utmost care being taken to joint these courses evenly and securely into the former ones: the vacant space is then rammed up with earth, and a new excavation proceeded with at each end as before. The engineer ought frequently to renew his level-marks from fixed and good bench-marks on the ground, and to examine and adjust the ranging line, and also himself most carefully inspect each working of the tunnel, and examine, by stretching a fine line along its centre, and measuring and levelling to his ranging line in the tunnel-pit, to see that every part of the work is proceeding exactly in the same line, and so that when in process of time each adjacent working shall be joined, and the tunnel be completed, the whole may form one exact and truly straight arch. If the ground proves loose and bad for standing, it will be proper to continue the work, by different sets of men, without any intermission; and care should be taken that the work never is left, even for a night, without templets, or short pieces of plank, being put up to cover the roof, that is necessarily left open to admit the men's heads and arms, while they are turning and backing up their last length of work at the crown; and these templets should be securely shored up by spars or struts, to prevent the earth from settling or falling in, which has actually happened in some tunnels, owing to the neglect of this simple and necessary operation, so that a considerable length of the tunnel required to be dug out from the surface of the ground to repair the breach. When the tunnel and ends are completed, ditches are to be dug out, across the

headings, near the entrances of the tunnel, and a substantial puddle-ditch carried up, to effectually dam them up, and force the water that afterwards collects in them to rise up into the tunnel, through cross-headings to be left for that purpose.

The tunnel at Blifworth, on the *Grand Junction* canal being the latest that has been completed (Feb. 1805,) we have ascertained the following particulars relating to it, in order to give some idea of the present state and expences of tunnel making. The internal width of this tunnel is $16\frac{1}{2}$ feet, the depth below the water-line to the inverted arch 7 feet, and the soffit or crown of the arch is 11 feet above the same line. The side-walls are the segments of a circle of 20 feet radius, the top arch of one of 8 feet radius. The side and top walls are 17 inches, or two bricks thick, and the bottom or inverted arch 13 inches, or $1\frac{1}{2}$ brick thick; every fifth course of the top arch, and every eleventh of the side walls, is composed of two heading bricks, or wedge-like, one inch thick on the inside and three at the back; also, every fifth and eleventh course as above (but between the courses of heading bricks) are composed of bricks laid obliquely across the others, the front and back corners being cut off for that purpose in the making, for more effectually breaking the joints, of work obliged to be done in such short lengths. The mortar that was used, was composed of one bushel of Southam lime (*blue lias*) and three of good sand. Six inches under the water line, on each side of the tunnel, slide-rails of fir, 5 inches square, to keep the barges off the walls, are fixed by pieces of oak let into the wall below them; which rails project 9 inches from the wall, and have at every 9 feet, a chock of wood upon the rail, for the bargemen to set their pole against for shoving their barges along. And we were told that this tunnel was contracted for, at 15l. 13s. per yard run; the soil principally a hard blue clay, with two or three thin rocks in it. Sufficient headings had been executed several years before at the company's expence. The same contractors were paid $10\frac{1}{2}$ d. per cubic yard for excavating the deep cutting at one end of this tunnel, and 11 d. per cubic yard for the other. The expence of driving the above headings were, we understood, from 36s. to 42s. 6d. per yard run. Nineteen tunnel-pits, some of them 60 feet deep, were sunk for the use of the above tunnel, which cost about 30s. per yard in depth including steining. In our inquiries respecting Braunston tunnel, on the same canal, we were told, that 320 yards of the same was drove in quick-sands, and that it cost 4800l. extra on that account. The Foulridge tunnel on the *Leeds and Liverpool* canal, of 1630 yards long, proved to be in such very loose and bad ground, that the whole of it, but about 700 yards, was obliged to be dug out from above; in some parts 30 yards wide at top, and near 20 deep, and immense works of timber were necessary to support and keep the banks apart, while the tunnel was turned, and the soil filled in again. Some part of this work, done about the year 1794, cost 24l. or more per yard run.

After a good length of the tunnel has been completed and well backed up, and been allowed some days or weeks for the earth to have settled regularly upon the brick-work, the centering may be removed, by loosening the screws and taking it to pieces, to be again put up and used further on in the same working. In tunnels upon high levels in porous soils, and in others sometimes near their ends, or in crossing any dry and porous stratum, it may be necessary to excavate the bottom a foot or 18 inches deeper than usual, and to fill the same up again with well wrought and stiffish puddle, and to turn the inverted arch, and as much of the sides as are below the water-level, upon the same, when set. Mr. *William Chapman*, page 52 to 54 of his *Observations*, &c. before

quoted, has given several directions for setting out tunnels, where coal-strata are intended to be intersected and worked thereby, as at Worsley on *Bridgewater's*, and Harecastle on the *Trent and Mersey* canals. It will be a matter of some importance, for the engineer to attend to the removing of the top soil from a sufficient space near each tunnel-pit, and to cause the same to be evenly covered, or the holes therein filled up, with the stuff that is drawn up and wheeled away from the tunnel-pits; and as fast as the different parts of the tunnel are completed, reserving stuff enough to fill up such tunnel-pits as are not to remain for air-shafts, to cause the top-soil to be returned upon such places, to avoid a heavy expence for spoil banks, besides putting the farmers and neighbourhood out of temper by seeing the apparent waste and devastation that such works make, when carelessly or negligently performed. The want of a towing path through a tunnel must be very apparent, to all such as have seen the tedious and barbarous process in use, of a man lying at length upon the gunnel of the barge, and pawing the walls with his feet; in narrow boats this is still more evident, where a plank is obliged to be laid across the barge for the men to lie down upon their backs, in order to be able to reach and paw the walls with their feet! The tunnel near Atcham on the *Shrewsbury* canal, though of 970 yards in length, has a towing-path through it; so has one at Newbold on the *Oxford* canal, and many other short ones in different places. In all short tunnels, and even in long ones, if the ground proves, on examination, sound and good for tunnelling, it certainly would be worth while to give the necessary width to the arch, to admit of this essential appendage.

Among the most considerable tunnels that we have, are those at Worsley on *Bridgewater's* canal, 18 miles in length! Mariden on the *Huddersfield*, 5280 yards; Sapperton on the *Thames and Severn*, 4300 yards; Penfax on the *Leominster and Kingston*, 3850 yards; Laplat on the *Dudley*, 3776 yards; Blisworth on the *Grand Junction*, 3080 yards; Ripley on the *Cromford*, 3000 yards; Dudley on the *Dudley*, 2926 yards; Harecastle on the *Trent and Mersey*, 2888 yards; Norwood on the *Chesterfield*, 2850 yards; West-Heath on the *Worcester and Birmingham*, 2700 yards; Morwelham on the *Tavistock*, 2500 yards; Oxenhall on the *Hereford and Gloucester*, 2192 yards; Braunston on the *Grand Junction*, 2045 yards, &c.

The longest tunnels that have been proposed, besides the above, were one of 5 miles on the once proposed extension of the *Manchester Bolton and Bury* to the Calder river; and one of $4\frac{1}{2}$ miles on the *Portsmouth and Croydon*, through the chalk hills south of the latter place. The towns of Manchester, Kidderminster, and Southampton appear to be tunnelled under by the *Bridgewater's*, *Stafford and Worcester*, and *Southampton and Salisbury* canals respectively.

The executing of deep-cuttings appears to have been long familiar to the Chinese, since we read of some of their canals that are in places excavated 80 feet deep! and of others that are cut 20 feet deep for seven or eight miles in length! The setting out and determining upon the slopes of a deep-cutting of considerable depth and length, are objects deserving more of the engineer's attention, than has in too many instances been bestowed upon them: the first step, after the line and the level of the intended canal are determined upon, should be to examine minutely the soil in every part that is to be cut in, and to prove the same by the sinking of several shafts; if any of these, towards the centre of the hill, should be found in loose and porous soil full of water, while the ends of the intended cutting may appear to be in sound stuff; it will be worth while, in some such cases, to put down pumps and erect a temporary steam engine, to pump

up the water during the work, and to drive headings from such pump-shaft, on one or both sides of the intended cutting, and below its bottom, as has been before mentioned, preparatory to driving a tunnel. Should the whole of the cutting appear to be in loose alluvial stuff, full of water, and disposed to slip, or a part only of the ground at one end, as happened at the south end of the deep-cutting near Tring, on the *Grand Junction* canal, it certainly will be right to begin such part, by driving a heading up from a proper point below the intended cutting, and to give time for the springs to drain off before the cutting is begun, which may afterwards proceed in separate lengths at the same time, and with much greater certainty and dispatch, by the help of cross headings, to drain off the water, than is practicable without such precaution, unless expensive and very powerful pumps or machines are used in the works to clear them of water in different places; while the tendency to slip is much increased by such sudden and partial drawing off the water. Slips are among the most formidable accidents to which canal-works are liable, and can hardly be too much guarded against, by giving an extra slope to banks in such places, but particularly by driving headings behind such parts, some time before the workings are begun, in order that the springs may be intercepted, by which the most porous and loose stuff like quick-sands may, in many instances, be converted to sound and good standing stuff. After all, where the strata alternate very fast, and have a considerable dip, and any slippery matter like fullers earth or potters clay intervene, adjoining to a porous soil that can supply it with moisture, it is almost impossible to avoid slips, that will prove most disastrous in their consequences, both in expence and delay of the works; as happened in the Tring deep-cutting above mentioned, on the *Gloucester and Berkley* canal, and many others which we have heard of.

When the engineer has, by a thorough investigation, as above recommended, ascertained the nature of his ground, and its tendency to slip, he can determine what slope the upper banks A B and P K (*Plate I. Canals, fig. 6.*) ought to have in every part; for these ought not to be regulated by the slopes C F and I G, against which the water is to lie, and the waves of the canal to act, but be as steep as the ground or rock will stand, in every considerable length together; and the degree of the upper slopes will be liable to vary accordingly; if these are too much sloped, a waste of land and of labour in excavating and making spoil-banks will be occasioned, while if they are made too steep in slippery or loose wet ground, slips may happen that will occasion still more serious expences, and delay also. All these preliminaries being settled, and the width in every part calculated, a number of slope-holes must be dug at A and P, and a lock-spit dug out to join them, by a careful workman, as mentioned before on the marking out of the canal; and the top-soil being removed and clamped, from a sufficient space for stowing the stuff, the work will then be ready for the contractors to begin digging. This will be our proper place to notice several machines, and contrivances for assisting the operation of excavating of canals, docks, or other deep-cuttings. The most simple and usual method for small depths is by runs of wheeling-planks, supported in an oblique direction up the side of the bank upon horfing-blocks of different heights, on which the labourers wheel out the stuff. In larger works, turn-beams or horse-gins are erected on the bank, and a level-stage or scaffolding is erected over part of the deep-cutting; two ropes wind and unwind contrary ways off the drum or barrel of the gin, and pass over pulleys fixed over the end of the stage; these ropes terminate in three smaller ones, two of which have at their ends,

rings, and the other a hook, of iron. When a loaded barrow arrives on the run below the stage, a labourer stands ready to slip one of the rings on to each of the handles of the barrow, and to hook the other end into the fellyes of the wheel; when the revolution of the gin draws up the loaded barrow to the stage above, which a labourer lands, un-hooks the three ropes, and affixes them in like manner to an empty barrow that is to be let down, while a full one is ascending as before, by the other rope. The loaded barrows are wheeled away upon the stage, and run therefrom to any place above that is desired. At the *London Docks*, we saw a very simple method used; two strong posts were set fast into the top of the bank of the dock, at 40 or 50 yards from each other; and at about five or six feet high on each, a large common pulley or ship's block was fastened, by a short length of rope; through these blocks a strong rope was run, whose ends terminated in two smaller ones, with rings at their ends, as before mentioned: the length of this rope was so adapted, that one end reached to the bottom of a very steep run or plane of planks that were laid and fixed on the bank, pointing up to the post at top; while the other end was nearly at the top of another similar plane at the other post. At a proper place between the two pulleys, the whipple-tree of a horse's harness was attached or lashed on to the rope. The operation was conducted, by a man arriving at the bottom of the plane with his loaded barrow, the wheel standing at the foot of the plane, the end of the rope being at the bottom of the plane, and the horse standing still near the post at its top; the labourer then slipped the two rings on to the handles of his barrow, and the horse being set in motion towards the other post, the barrow was drawn up the plane, and the man also with it, who made use of his feet, sustaining himself from falling backwards by holding fast by the barrow handles, which he at the same time was enabled to guide; when arrived at the top, and entered upon a plane there of less inclination, the horse had arrived almost at the other post; and while he was stopped, and was turned round ready to return again, by the boy who attended him, the labourer slipped the rings off his barrow handles, and wheeled the same away upon the upper run; another labourer instantly slipped these rings on to the handles of his empty returning barrow, and the return of the horse let him and his barrow down the plane again, the handles going first, and the man holding them as before, but with his back to the barrow; while the other ends of the rope were drawing another labourer and his loaded barrow up the other plane as before. The simplicity, dispatch, and perfect operation of this contrivance, do great credit to its inventor. In very considerable works, it will be attended with the greatest dispatch, as well as ultimate saving of expence, to use trams and temporary iron rail-ways; and if the height and quantity of stuff to be delivered at any one place be very considerable, inclined planes, with steam-engines of small dimensions, (such as are now every day manufactured and improved) should also be erected, to draw up the trams, as at the *London Docks* above mentioned. It is evident, that the simple and straight course for the horse, attached to the middle of a rope as above, may often be substituted for the expensive turn-beams above mentioned, particularly where dispatch in setting the apparatus to work is an object.

Mr. *Ralph Dodd* appears to have contrived a machine to be worked by men, by the means of levers, for excavating canals, which was tried in the year 1794, in the deep cutting at Dawley near Hayes on the *Grand Junction* canal. Mr. *Carné's* machine for the same purpose, but worked by a horse at length, appears to have been used in 1794, in the

deep-cutting near Coston Hacket, on the *Worcester and Birmingham* canal. In the *Monthly Magazine*, vol. ii. p. 594, we have the following account of the operation of *E. Haslewood's* patent excavator: "This machine takes the soil from the bottom of the canal, at 40 feet deep, with equal facility as at six feet from the surface! One of them is at work upon the *Gloucester and Berkely* canal. By the assistance of two men only, it removes 1400 loaded barrows from the bottom of the canal, to the distance of 40 feet, in 12 hours; and is so contrived, as to take up the loaded barrows, leave them at top, bring down the empty ones in regular rotation, and leave them at the bottom. It can be moved along the canal to the distance of 26 yards in 10 minutes, by the two men that work it."

In October 1793, Mr. *Joseph Sparrow* took out a patent for a machine, consisting of a box, with its bottom opening on hinges, suspended by a sort of universal gib or crane, the whole moving upon wheels; which he strongly recommends for elevating and discharging the soil dug out of the canal. See *Repertory*, vol. v. p. 77.

Among the most considerable deep-cuttings, are those at Ashton on the *Lancaster*, Tring on the *Grand Junction*, Coston Hacket on *Worcester and Birmingham*, Burbage on the *Kenet and Avon*, Little-borough on the *Rochdale*, Smethwick on the old *Birmingham*, &c.

The construction of Locks is so important a part of canal-making, and they are so very essential to the system itself, that we shall give some brief particulars of their history. Mr. *William Chapman*, in his "Observations on the various Systems of Canal Navigation," has devoted his 7th chapter to an account of the internal navigations of China, compiled from Sir George Staunton's and other authentic accounts. He observes, that our pound-locks are unknown in China, (although explained to them by the French missionaries in 1685); and it appears from his account, page 76, that their grand or principal canal is, in fact, only a river or stream navigation, although greatly diverted by art from its ancient course in some parts; the current of the water being slow, and prevented from running off too rapidly by its descent being occasionally checked by flood-gates, consisting of two abutments of stone, one projecting from each bank, and leaving a space in the middle just wide enough to admit a passage for the largest vessels employed upon the canal; and to prevent unnecessary waste of water through the flood-gates, the passages are occasionally closed by planks let down transversely and separately one above another, their ends resting in a vertical groove in each abutment; and he observes, at page 89, that it was probably between the years of the Christian æra 605 and 618, that these were introduced. At page 87, he says: "The Chinese method of overcoming ascents appears to be long subsequent to the attempts of the Egyptians, under the successors of Alexander, who, according to Mons. Huet, bishop of Avranches, had the art of constructing sluices, or locks of one set of gates, so as to stop the impetuosity of the current, and be occasionally opened. Though termed gates, the openings were most probably closed with beams of timber, let down in grooves; as gates of large width and depth could not be opened without difficulty, even against a small difference of level. There are, however, such sluices with gates upon several of the running canals on the verge of the *Shannon*. They were erected about the middle of this century, (1750) and are of difficult use, because of the force requisite to open them. These running canals are on the Chinese principle, and nothing more than new channels for a portion of the river; which, when it is low, are stopped as in China, to retain a head of water sufficient to pass the boat." And

Mr. Robert Fulton, in his Treatise before quoted, page 7, says: "Machines similar to those of the Chinese have been erected in Flanders, on river-navigations, when interrupted by falls, or shoal water; while another mode adopted has been, to erect a dam or wear across the river below the fall, in which were placed two strong buttresses of stone, with perpendicular grooves; after passing the boat above the buttresses, a strong gate was let down the grooves, which stopped the water till it ran to a sufficient height to enable the boats to pass." This last description of Mr. Fulton, and which we have also seen in several other places, seems to come nearer to the invention of locks than the others above, which is the reason that we have inserted it, before finishing this subject from Mr. Chapman, who continues at page 88, and says: "These single pairs of piers of the Chinese, are properly called by De la Lande, half-locks. The casual position of two pair of piers near to each other, has, no doubt, occasioned the invention of locks; as it would soon be seen, when the gates or stop-beams of the lower piers were closed, and of sufficient height, that the water would be nearly still between the upper pair of piers, and afford an easy passage. On this principle, in place of single pairs of piers, two pair would be erected, sufficiently near to each other for the purpose, and capacious enough to hold a fleet of boats. It would soon afterwards be found, that in dry seasons the waste of water was greater than could be conveniently afforded, and the operation tedious for single boats; thus would progressively arise the invention of locks with walled chambers, and sluices through their gates or walls. There are at this day existing on rivers locks of the first construction, composed simply of two pair of piers, without any connection of walls or pavement between them." The Kennet and the Lea have unwall locks. Here we may add, that Mr. Thomas Telford, when projecting the Inverness and Fort-William canal, on account of the great plenty of water and magnitude of the vessels that are to pass, proposed not to wall the locks the whole length, but to have earthen banks between the two pair of piers of masonry, that support the upper and lower gates of the locks. Mr. Chapman has suggested the paving of the concave bottom and sloping sides of locks, in similar situations.

It appears from M. De la Lande's *Traité des Canaux de Navigation*, that the first lock was supposed to be erected in the year 1488, upon the Brenta near Padua; and that shortly after, the two canals of Milan, between which there was nearly a fall of 34 feet, were joined by means of six locks similar in principle to those at present in use. The first lock that James Brindley erected, appears to have been at Compton on the Stafford and Worcester canal; but they were not at that time uncommon in England on several of the rivers, and on the Sankey canal.

A Lock or Pound-Lock is the connecting part between the two pounds or reaches of a canal, that are upon different levels, and this part, called the chamber of the lock, can at pleasure be made to coincide, in the level of its water, with either the upper or lower canal. This is managed by means of two pair of doors or gates, one at each end of the chamber of the lock; in which gates, or through the side walls of the chamber, are provided small sluices or paddles, by which water can be let from the higher pound to fill the chamber to the upper level, the lower gates being close shut; or to empty the same to the level of the lower canal, the upper gates being close shut: by which means, supposing the lock empty (this term is often used, but it is not to be literally understood, since the lock, when said to be

empty, has the same depth of water in its bottom as the lower canal has), and a vessel or boat arrived on the lower canal, there will be no difficulty in opening the lower gates, and entering the lock, because the water is level and at rest; when entered the lock, the gates are shut after it, and water is drawn from the upper canal by the paddles or cloughs, and in a few minutes the lock becomes full, the boat having risen with the water; when this is the case, the upper gates can be opened without difficulty, the pressure of the water being equal on both sides of them, and the boat can now move forwards on the upper canal. In this state of the lock, we have only to suppose another boat to enter from above, and shut the upper gates after it; when the upper paddles being close shut down, and the lower ones opened, the water will sink in the chamber, and the boat with it, until the lower gates can be opened, owing to the level of the water, and the boat can proceed forwards on the lower canal. The two operations which we have described are called *locking up* and *locking down*.

In Plate V. *Canals*, figs. 36, 37, 38, and 39, we have given a plan and sections of a lock. We have before observed, that the fall at each lock ought to be equal; and the locks ought to be all of one width and length, unless water be in great plenty, and any local trade of a particular kind may require them to be otherwise; because then, a barge in descending through a line of locks will require the same quantity of water at each lock, which we may suppose to descend with the barge, and there will be no water to discharge uselessly by the weirs, or required from feeders, by such a barge during its descent, as must happen in descending through a series of unequal locks. The upper gates of a lock (See the section, fig. 37.) stand on a weir, or wall, as figs. 36 and 37, across the canal, called the breast of the lock, and the place of this is to be fixed by the engineer before the workmen can begin to dig out the ground for the lock; which being done, an inverted arch, with a slight curvature, is turned very sound with bricks or good hewn stones, as a floor to the chamber of the lock, which, if the soil is porous, should have a lining of puddle under it, and should be worked into the side and breast walls: the foundation of these walls ought very carefully to be attended to, and if the ground is not very sound and good, piles must be drove, and the foundations of them secured in the most substantial manner. Instead of turning an inverted arch under, and for some distance within and without the lower gates, two rows, or more, if the soil is very porous or soft, of pile-planking, or dove-tail pikes, are to be drove across the bottom of the lock (as shewn in the sections by 1 1, figs. 37 and 39.); the length that these are to enter into the ground will, in a great measure, depend on the softness and porosity of the bottom. Pile-planks, or dove-tail piles, are stout pieces of narrow elm or oak planks, represented in Plate IV. *Canals*, fig. 30, each having a groove down its side to receive a thin slip of deal or other straight-grained wood, to break the joint, and prevent the water from getting through; the pile A is supposed to be the centre one, or that which is first drove, and is sharpened at bottom by a bevel on each side for that purpose, and shod with iron, if that precaution shall appear necessary; the other pile-planks B, C, D, &c. that are drove in succession, are sharpened to a double wedge, but instead of the acute angle being square to the pile, it is bevelled to about 45°, by which the pile B will be forced close to the pile A as it is drove, and the pile C to B, &c.; by which, and the slips or tongues afterwards put down the grooves, an impenetrable barrier is formed to prevent the water from soaking and softening the founda-

foundation, and at length undermining and blowing up the lock-gates and walls. The heads of the pile-planks should be sawed off very smooth and true after they are drove, and a cross bearer or sleeper is to be nicely fitted to them, and firmly spiked down: other intermediate and parallel sleepers are to be fixed down upon the heads of bearing-piles drove for that purpose, and the whole is to be covered, after the intermediate spaces are closely filled up with bricks and cement, by very found and nicely jointed planks, that are called the *sheeting* of the lower gates, as shewn in the plan, *fig. 36*, and section, *fig. 37*. Upon this sheeting the lock-fill is to be fitted and strongly fixed down; if the canal is wide, or the fall of the lock considerable, this ought to be composed of two pieces of oak timber, each abutting against the hollow quoins at one end, and meeting at the other in an angle towards the head of the lock, as in the plan, whence such are often called *mitre-fills*. A similar precaution is to be used on the breast of the lock, by driving a row or more of good long pile-planks, with cross pieces or sleepers, and sheeting for the upper gates, on which the lock-fills are to be laid; as also a stout piece of wood, cut to the curve of the breast-wall of the lock, to which it is to act as a coping, to prevent the keels or stems of the barges from damaging the same. It is usual to set out the foundations of the lock-wall straight and parallel to each other, (excepting the wing-walls or return-walls at the end to keep up the earth, and connect with the sloping banks, in the upper and lower canals) and when these walls are arrived at the height of the floor of the chamber, and sheeting of the lower gates, then to begin to batter them back to give them greater strength. On the *Derby* canal we found the locks 90 feet long between the gates; the bottom line of the foundations straight, and exactly $14\frac{1}{2}$ feet apart; as the walls rise they are gradually battered between the gates to 15 feet apart; and in the middle between the gates to $15\frac{1}{2}$ feet, so that the coping of the walls of the chamber of the lock are curved three inches towards the back; and all the best modern locks are constructed on similar principles. Hollow quoins, which are large hewn stones, having a regular curved space cut out of one of their angles, are worked into the walls for the gates to work in, instead of hinges, as shewn in the plan, *fig. 36*; if good durable free-stone is difficult to be procured, the hollow quoins may be composed of very large bricks made in proper moulds for the purpose; and in large works, a large piece of cast iron of the proper shape to work into the wall, is sometimes used instead of quoin-stones or bricks, as at the *London Docks*. The tops of all the walls, locks, bridges, or other erections of a canal, ought to be coped with hewn and well jointed stones, and cramped together; or with large and well burnt bricks of the proper shape, having their top angles rounded off, and set in good cement. Proper buttresses of close masonry should be made to the walls of the lock behind, to give them greater strength, and to tie them more effectually into the bank, and to break the regularity behind, so that if water should leak through the walls in any particular part, when the locks are filled, or allowed to stand full longer than is proper, such water may not connect together in a large extended sheet, to act by its hydrostatic pressure in overturning or bulging in the walls, of which we have read and seen so many instances. A proper space behind all the walls should be puddled, allowing each course to set effectually before another is applied; and provision must be made, in carrying up the walls, for crooked culverts, each of 14 to 20 inches or more in diameter, according to the supply of water and dimensions of the lock, called the *paddle-holes*, to extend from near

the floor of the chamber of the lock, behind the walls, and rising up, so as to return into the lock again behind or above the upper gates; its plan being shewn by dotted lines *ee*, in *fig. 36*, and its vent, or lower end *e*, is seen in the section, *fig. 37*, as its mouth or upper end is in the section, *fig. 38*; in the latter case, one of them being shewn open, and the other closed by its paddle or clough. A recess is made in each wall above the several hollow quoins, large and deep enough for the gates to open back into, and remain out of danger from barges passing into or out of the lock, as shewn in the plan, *fig. 36*. In the recesses belonging to the upper gates, a weir or over-fall, *ii*, *fig. 38*, for the water, is provided, four or five feet long, having a coping or fill of good stones or bricks, just the height at which the water is intended to stand in the upper pound or canal; these are called the *paddle-weirs* or *lock-weirs*; a large flat stone is usually laid over these, leaving three or four inches in height for the stream of water, to complete the wall upon, and the cavity is conducted down, diminishing in width and enlarging in depth behind the walls of the lock, into the *paddle-hole*, or crooked culvert before mentioned. The construction of the paddle-holes and weirs deserves the particular attention of the engineer, to see that they are constructed of the very best bricks, laid in good cement, and the same allowed to set thoroughly before the canal is filled; or the rapidity, and frequent action of the water in these parts, will wear, undermine, and endanger this part of the lock.

We may proceed now to describe the other appendages of the lock; these are the lower gates, which ought to be constructed of stout oak framing, the head or hinge post of the gate being rounded and nicely fitted to the hollow-quoins above described, while the other heads are carefully chamfered off, so that when the gates are set up in their places, touching the hollow-quoins, and the mitre-fills, their chamfered heads shall meet and truly fit; instead of hinges, either a rounded part of the head of the gate, or a strong gudgeon of iron at the bottom, is let into a hole provided in the stone or timber below, but not fitted thereto so as to bind, or prevent the rounded part of the head from being pressed closely and uniformly into the hollow-quin by the force of the water; the top of the gate is kept in its place by a strong strap of iron which goes round it, allowing sufficient space, and is keyed or screwed down to a strong cramp or pin in a large stone, which acts as a coping to the hollow-quoins. The gates are usually planked with deal, sometimes upright, but often in a diagonal direction; and a square hole is left in the boarding of each lower gate, to which a paddle is adapted, with its stem or rod rising up above the top of the gate, by the side of a standard of wood, *k*, *fig. 39*, fixed to the top rail or balance beam of the gate in which is a pinion, working into a rack of cast iron on the paddle-stem, which is turned by a winch-handle, and the paddle is retained at any height to which it may be drawn, by a ratchet or stop, that can readily be turned up to lock into the teeth of the rack, or turned down to discharge and let down the paddle. The top piece or balance beam is usually a tree of considerable dimensions, having its full size, or but end, left unhewn to act as a handle to turn the gate round by, and at the same time to balance it, so that the front of the gate may not drag on the sheeting at bottom; but as it would be very difficult thus to balance large lock-gates, like those at the *London Docks*, a roller of brass or cast iron is fixed under the head of each gate, and a strong circular fill of wood, or rail of cast iron is prepared on the sheeting, for the same to roll freely upon,

upon, and cause the gate to open and shut easily: the height of the roller above mentioned is made adjustable by a screw, so that the gate can at all times be kept from dragging on the sheeting: and instead of handles to open such gates, ropes and chains, and capstans, erected on the banks for the purpose, are used to open and shut them. The upper gates are hung and constructed nearly like the lower ones, except that they have no paddle-holes in them, and are usually boarded no higher than the level of the paddle-weirs behind them, in order to assist as weirs in carrying off a superfluity of water; but these are often attended with bad consequences, the fall of the water wearing, and in time damaging the breast of the lock; and in floods, the stream or splashing of the water may damage goods in, or even endanger the sinking of, heavy laden boats, in the lock; the same may also happen with deeply laden boats when the paddles are drawn in ascending, if the paddle-holes do not enter the chamber of the lock at some distance below the surface of the water, and in a proper direction: on the *Monmouthshire* canal the paddle-holes are both united, and discharge themselves through the breast of the lock into the chamber; a practice that seems by no means worthy of imitation. The upper paddles, or those behind the upper gates, are drawn by a rack and pinion, *k*, *fig. 38*, by means of a winch-handle, (which each bargeman and lock-keeper carries with him) in the same manner as those in the lower gates, which we have described above. Guard-rails or curving pieces of timber, *f*, *fig. 36*, ought to be strongly bolted on to piles driven for that purpose in the front of the wing-walls just above the surface of the water, to guide the boats into and out of the locks, without striking the walls; which is far preferable to the huge stones let into the wing-walls in some places, called bumping stones, and calculated rather to break and destroy the barges, than protect the walls. It will be necessary also to provide a strong piece of wood formed to the curve of the breast-wall of the lock, *b*, *fig. 37*, before which it should be suspended a few inches above the water when the lock is empty, by means of two or three chains; these are called bumping pieces, and are intended to receive the stem of the boat, and prevent it striking the wall when the same is not strapped or stopped in proper time; a practice, however, for which the bye-laws or clauses in the act should provide adequate fines or punishments: and strapping posts should be set firmly into the ground in the proper places for the bargemen to wind their rope, or strap as they call it, and by easing it out by degrees, to stop the velocity of the boat before it arrives at the gates or breast of the lock that it is entering. The gates should also be furnished with two or three strong upright planks on the lower side, *g*, *fig. 39*, to receive occasional blows from the noses or stems of the boats, and prevent the planks of the gates being broken or started thereby. There is room for the skill of the engineer to be exercised, in forming the lock-fills and gates to that particular angle which will render them stronger for the same width and depth of lock, than they would be if they met more acutely, or were shorter and met more obtusely. In very large and wide locks, the gates should not be straight or plane, but a little curving to give them greater strength. On narrow canals, it may not be necessary to make double or angle gates, but one gate shutting square across the lock may be strong enough to answer every purpose, and be opened more readily than two gates on the opposite banks can be; the upper gates in particular, on account of the comparative shallowness of the water there, may be single, while the lower gates, if the fall is considerable; may be double. In setting out canals, where the fall

of the ground is very gradual and easy, it may be necessary to avoid long lengths of deep-cutting below, and of embanking above, or making the line very crooked, to make shallow locks, if water is plenty; and under the same circumstances only, will it be allowable to make 10, 12, or more feet locks in particular places, however well the ground may suit the same; many of these double locks were at first erected, as on the old *Birmingham* canal, and the *Calder and Hebble* navigation, where about 1783 single locks were obliged to be substituted, to avoid the waste of water, before pointed out.

We have not yet noticed an inconvenience and waste of water, which attend the placing of locks nearer to each other than about 100 yards, or having basins between them, equal in area to about that length of the canal, as was done at Salter Hebble in 1783 in the alteration above mentioned; without which precaution, a boat in descending lets down more water than the pond below will hold, without raising its surface so as to lose a good deal over the lock-weirs; and still worse happens in ascending, for the short pens are so much lowered by filling the lock below, that laden boats are unable to proceed for want of water, until a supply is let down to waste, through the upper lock, to help them forwards. As many locks as can conveniently be brought near to each other, on the principles above, and before explained, should be contrived, if it can be done, to be in sight of each other, and of a length of canal each way; and the lock-keeper's house should be so placed, that he can when at home at his meals, or otherwise, in bad weather, see barges approaching the locks, in time to meet them before they enter the locks. Mr. *Fulton* who wrote in 1796 says, that the cost of locks for 25 ton boats, was about 70*l.* per foot rise, and for 40 ton boats, about 100*l.* per foot rise; this may serve to give some general idea of the cost of locks at that time; but we would observe, that the decrease of the value of money, and the exceptions to all general rules on these subjects are so many, no dependence ought to be placed on such modes of estimating. If sufficient water-way is given in the paddles, and there is assistance enough to draw both the paddles, and open and shut the gates at the same instants, a boat may pass each lock of the usual construction and rise, in three minutes time, but in general, 5½ minutes will be nearer to the average time lost at each lock, as observed by Mr. *Bevan* on the *Grand Junction* canal. Theorems for the time of filling a lock of given dimensions, and with given paddles and fall of water, should be found and compared with many experiments on the locks under the care of our resident engineers. (See *Nicholson's Journal* 8vo. N° 9, vol. iii. p. 30.) It should be considered, that a boat going up lets down or consumes twice the weight thereof (boat and cargo included) in water, more than in going down through each lock; for the boat on entering the empty lock, expels as much water into the lower reach as its own draft of water, which is made good out of the upper pound when the boat enters the same; while a descending boat expels its own flotation bulk of water from the full lock into the upper pound, where it is retained on the shutting of the upper gates; the mean of a passage each way will be a lock-full for each boat, unless they go always loaded one way, and empty the other. Mr. *Fulton* says, that the consumption of 25 ton boats through eight feet locks, will in general be about 163 tons of water in ascending, and 103 tons in descending; and Mr. *Chapman* informs us, that boats passing and repassing a summit, laden one way, and returning empty, will require nearly 13 times the weight of their lading of water for their lockage, out of the summit pound.

pound. Seven hundred tons of lading per day are as much as pass or repass upon any one of our canals, according to Mr. *Fulton*.

We cannot with propriety quit the subject of constructing locks, without mentioning *coffer-dams*, which are a double range of piles drove very close to each other in a circular form round the mouth of any canal or dock, that is to have a lock built, repaired, or altered, connecting with the sea, a river, or any existing navigation that cannot be emptied of its water; the interval between the piles being filled with earth, the water in the space between the coffer-dam and the intended works is then pumped out for the works to proceed; the many and fatal accidents to which these are liable, especially when the works are nearly completed, and the earth is excavating from the bottoms to open the passage freely to the lock or works, require all the precautions, skill, and attention of the most able engineers, especially when the rise and fall of the tides or waves of the ocean, present unequal action on the piles and dam.

The *saving of water in the use of locks* is a consideration of so much importance in most of the instances which occur, that it is necessary we should mention several of the expedients which have at different times been proposed, or practised for that purpose. Some of the most obvious of these are, a minute attention to the fitting of the gates and paddles, constructing every part of them of the most seasoned and durable materials, with the utmost precautions against partial wear or liability to accidents, by which the gates or paddles would leak and waste the water; and should such leaks happen, the establishment for working the canal ought to be such, as to detect the same immediately, and apply the proper repair or amendments without delay. It is of great importance to adapt the plan or surface of the water in the lock, to the size of the boat or boats that are to be used, leaving as little water uncovered in the chamber of a lock as possible, and for this purpose, where water is scarce, it will be necessary to enforce the regulations, that the act ought to contain for the length, width, and form of the boats that are to be used; and on canals for large and small boats, to see that two or more of the smaller boats are so contrived as to lie close together in the lock, and occupy the whole space thereof as one of the large boats would do: less than this number of small boats must not, when water is scarce, be allowed to pass, or without paying such increased tonnage or lock-dues, as will act like a prohibition.

The *waiting for turns*, particularly by empty or lightly laden boats, ought also to be provided for, and it may be necessary on some occasions to enforce the same; viz. to suffer no boat to pass down, until there is another arrived below, and ready to ascend as the lock is filled; or any boat to ascend, till another is ready above to descend with the same lock-full of water. Where small or short boats are in pretty general use upon a canal, as on the *Shrewsbury*, it may be right to adopt the practice which Mr. *Thomas Telford* has described, who says, "the locks are so formed as to admit of either one, three, or four boats passing at a time, without the loss of any more water than what is just necessary to regulate the ascent or descent of the boat or boats that are then in the locks. This is accomplished by having gates that are drawn up and let down perpendicularly instead of being worked horizontally; and each lock has three gates, one of which divides the body of the lock, so as to admit of one, three, or four boats at a time." See *Plymley's Report* before quoted, page 299.

A very sensible writer, who has given a full account of

the *Grand Junction* canal, in the *Agricultural Magazine* for 1803, vol. viii., under the signature of a constant reader, suggests at page 204, the propriety of an additional set of narrow locks on each side of the summit which is in want of water, for the use of the narrow boats, to which they should be exactly fitted; as also, to avoid the expence of lifting or pumping water, that can be collected in reservoirs or feeders at some distance below the summit level, by using shallow locks of only three or four feet rise each, between the summits and the points where such waters can be taken in without lifting. The pumping of water from a lower level to supply the waste of lockage, by means of steam engines, has been practised with success on the old *Birmingham*, the *Barnsley*, and several other canals; the *Croydon* was to be constructed with a dependence on this mode of supply, as appears by its act; and on the *Grand Junction*, engines have lately been erected near Tring and near Braunston, for raising water to the summit-levels. A very considerable power is lost in the descent of the water through the paddle-holes, to fill the lower part of a lock, and again through the gate paddles in emptying the upper part of the lock; we have often thought that it might be practicable to apply this power for returning a certain quantity of water into the upper pound, either by making the descending stream act on a wheel, or on vanes like those of a smock-jack, or by means of hydrostatic pressure, or momentum machines. See *Monthly Magazine*, vol. vi. page 124.

Side-ponds are an expedient for retaining part of the water, from the upper part of a lock when it is to be emptied, and to use the same towards filling the lock again for the next boat: they are said to have been invented by M. *Dubie*, and one with 3 divisions was tried in a lock of 20 feet fall, on the canal of *Nîmes*, near 100 years ago; they are described by M. *Beslidor*. On the 5th July, 1791, Mr. *James Playfair* took out a patent for this mode of saving water in using locks. See *Repertory*, vol. iii. 303. And in the same work, vol. i. p. 377, Mr. *W. Pitt* has described three side-ponds, in form of sectors of a circle. We read that in April last, (1805) an experiment was made on the *Grand Junction* canal, and two of these side-ponds, with earthen banks like a canal, and each about the same size as the lock, were tried near Berkhamstead; into one of them, whose bottom coincided with about half the height or altitude of the lock, the upper quarter of the water of the lock, for a descending boat, was drawn, and it was there retained by a close shuttle; the shuttle of the other side-pond, whose bottom was about level with one-fourth of the height of the lock, was then opened, and about another quarter of the water in the lock flowed into it, and was there retained by the shuttle; the remainder being emptied by the gate-shuttles into the lower canal; and the boat having passed out, and another ascending one taken its place in the lock, the side-pond that had last been filled was emptied into the lock, and then that also which had been first filled; these together filled half the lock, before the upper paddles were drawn to fill up the remainder, the shuttles of the side-ponds being first shut down; by this means, two boats were passed, by letting down only half a lock-full of water into the lower pound; and the lock remained full, ready for another descending boat, as before. The time taken up by the above operations was about nine minutes for each boat that passed, or $3\frac{1}{2}$ minutes more than if the side-ponds had not been used. We understand that side-ponds are becoming common on different canals; their construction offers a very curious exercise for the abilities and skill of the engineer, so to apportion the number, size, and height of the ponds, that, considering

dering the expence of construction, loss of time in passing, and the saving of water that is effected, the result may be the most advantageous.

It appears, that Mr. *Michael Logan* took out a patent in 1804, for raising or forcing water into a lock; also, that in January 1791, Mr. *Joseph Brooks* obtained a patent, for a method of drawing up the false or moveable bottom of a deep side-pond or large well near a lock, and by that means filling the lock with water, until a barge had passed up, or another was ready in the lock to descend, when the false bottom being again let down, the water retreated by the same connecting culvert that had brought it into the lock, it was again emptied, and the boat able to proceed on the lower canal, without having wasted or let down any water. See *Reperatory*, vol. vii. p. 361.

Mr. *Lawson Huddleston* has communicated, through the medium of *Nicholson's Journal*, 8vo. vol. iv. p. 236, a method of raising the water in a lock, from a deep side-pond or well as above, by means of a solid or heavy plunger that can be let down into the well, by means of machinery that suspends it, when the water is to be raised, and drawn up when it is to be allowed to sink again; the plunger being balanced in all its different degrees of immersion by a counter weight acting on a snail or spiral curve.

Mr. *Robert Salmon* has invented a different mode of accomplishing the same thing; his plunger being hollow, and as buoyant as possible; and for forcing the same down into his cistern or side-pond, when the lock is to be filled with water, he has contrived a very curious apparatus; it consists of a very heavy carriage on four low wheels, or heavy rollers of metal, connected together by a frame to answer the same purpose. Two frames or planes are prepared, that turn on fixed centres, as a door does on its hinges, but horizontally instead of vertically; the other two ends of these planes rest on the two ends of the plunger, by means of uprights therefrom and moveable joints; upon these planes the carriage rolls, in such a manner, that when it is drawn forwards, by means of a rope or other machinery, the weight advances upon the plunger, and the planes being at liberty to turn on their joints, it sinks the plunger by degrees, until at length the four wheels rest exactly over the joints at the ends of the plunger, exerting the whole weight of the wheels and carriage, to keep it down and elevate the water in the lock; on the carriage being withdrawn, the weight on the plunger lessens, and it rises, until at length the four wheels rest just over the hinges or fixed joints, and no part of the weight of the carriage or wheels is then exerted upon, or to counteract the buoyancy of the plunger, and the water retreats from the lock into the space under the plunger. That this carriage, which must be extremely heavy for large locks, may not be subject to run forwards or backwards on the planes; Mr. *Salmon* has contrived one of them with a peculiar curvature or bend, so that the tendency of the carriage is as great to advance as to retreat, in every part; and a constant and small weight, hung on the end of a line over a pulley, in the model, will cause it to move either way, with a regular and steady motion. During the last session of the *Society of Arts*, in the *Adelphi*, Mr. *Salmon* presented a model and description of his invention, for which he was honoured with a premium; the model is lodged in the Society's collection, for public inspection, and a particular description of the same is expected to appear in their next, or 23d volume of *Transactions*. Mr. *Salmon* has hit upon a method of mechanically constructing the curve above-mentioned for one of the planes, which is found to approach very nearly to the arc of a

circle. A mathematical friend of Mr. *Salmon*, who was shewn the model in an early stage of his experiments thereon, has proposed as the 84th question in *Leybourn's Mathematical Repository*, the determination of the nature of the curve in a particular application of Mr. *Salmon's* principle; we are sorry, however, to see this question still unanswered by the ingenious correspondents of that very useful and learned work; because this curve promises to be applicable on several occasions in the construction of hydraulic machines. We have been treating of various contrivances for saving water in the use of locks of the common construction; and we shall now proceed to mention several substitutes for locks in overcoming ascents on a canal or river, but in which the boat continues floating in water; before we proceed to inclined planes, or other schemes, in which the boat is to be drawn or suspended out of the water, or the goods to be removed by cranes, &c. to other boats.

Substitutes for locks, have been called for in some situations by the actual scarcity of water, in others by the previous and necessary appropriation of the whole of the streams to mills or the practice of irrigation, and not in a few cases by the jealousy and opposition of mill, park, and land owners; the intemperate zeal also of some projectors may have operated, who do not hesitate to prognosticate the annihilation of lock-canals, by "improved science; in like manner as improvement in machinery renders the old apparatus useless." See *R. Fulton's Treatise*, page 28 and 110, &c.; also, *W. Chapman's Observations thereon*, page 2, &c. Several canals have, like the *Hastingsden*, been restricted from erecting locks in particular places, without the mill-owners' consent; it is therefore no matter of surprise, that various schemes have been proposed to obviate the necessity of common locks. On rivers where the boats are hauled up against the stream, it is not unusual to lighten a boat by shifting part of its cargo into other boats, called lightening boats, so that their diminished draft of water may enable them to be dragged over any particular rapid; and in more extreme cases, the whole of the lading may be taken out, and be conveyed by land to meet the boat again after it has been dragged empty over the rapid. Rapids may themselves often be made navigable by jetties, or contraction of the width of the stream in such places, and if the fall is rendered very considerable thereby, capstans or machinery may be erected for the hauling up or easing down of boats; these methods have doubtless been in use from the earliest periods; and we read of great numbers of men in China being employed with ropes to haul boats up their artificial rapids or falls. The methods of using stop-planks occasionally to cause an artificial flood in Egypt, China, Flanders, and Ireland, as before-mentioned (when speaking of the invention of locks), are also very ancient, and such are still in use upon several of our rivers; on the *Ivel* river below Biggleswade, we think we remember seeing upright narrow planks used against a moveable beam at top of the water, and a fixed sill at the bottom of the same, for penning the water and producing a flush or flash of water, when the planks are removed and a boat is to pass. On most of our old river navigations there are gates erected to pen the water, and the same are drawn up to occasion a sudden flash while a boat is to pass. At the entrance of the *Worsley* mine on the *Duke of Bridgewater's* canal, we remember a large door that was drawn up for our boat to pass under it into the tunnel, and then let down to pen the water therein three or four inches higher than it stood in the canal. The difficulty of opening large gates, to produce a flush of water or to let a boat pass

has been before noticed; and in the *Memoires de l'Acad. des Sciences* for 1707, we find the description by *M. de la Hire* of gates calculated to obviate this inconvenience in part, by having a large pair of doors in the gates opening the contrary way, or with the stream, which on the drawing of a pin can be let to open by the pressure of the water; after which the great gates can be opened with ease, and when open, the doors can as readily be shut again and pinned: owing to their standing in the direction of the stream; and the gates then are ready to be shut again as soon as the head of water is run off, or the boat has passed. It appears, that in extending the navigation of the *Seine river* in France, gates were introduced, which the Duke of *Rouanes* had invented, and which are described in the *Memoires de l'Acad. des Sciences* for 1669, consisting of two upright gates, rather wider than half, and as deep as the channel of the stream or river, bent into the arc of a circle of about 48 feet radius; to each of these gates several long beams of wood were fixed, meeting in or near the centre of the circle, of which the gates formed a part; and here being firmly united, they abutted against a solid pier of stone, or worked on a centre-pin fixed in a strong pile, drove very firmly into the earth by the side of the channel, at 48 feet below the place where the gates were intended. A notch was formed in the bank of the channel on each side, in form of sectors of circles, sufficiently large to contain the two gates and their beams or centering as above. By this construction, the whole of the pressure of the gates when shut and the water penned by them, was brought to act on the two upright pins or centres; and a very moderate force applied to the head of each gate would draw them apart and into the sector-like recesses prepared for them, leaving the channel or course of the stream perfectly free of any obstacle, to check either the current or a boat in passing through. By a small adjustment of the places of the centres, gates of this kind may at all times be made to fit close to each other in the centre of the channel, on its bottom, and also to the side walls of the channel above them, and yet on being moved a small space from each other they may clear those walls and be free to move into the recess, in the bottom of which there may be small rollers to carry the gates with less friction, or rollers under the gates may be used for the same purpose. See *Jacob Leupold's Theatrum Machinarum*, folio, published in 1726 at Leipzig.

Dr. James Anderson, of Edinburgh, has contrived, and published in 1794, in his *General View of the Agriculture, &c. of the County of Aberdeen*, a method of elevating or depressing small boats, floating in a coffer or large tight open case full of water, that can at will be made to coincide and connect at one of its ends with either the upper or lower canal; into or from which the boats may pass without the loss of more water than is necessary to fill the narrow space between a draw-gate at the end of each canal and at the ends of the coffer, when the same is pressed and retained close to the end of the canal, and a small additional quantity to restore the equilibrium and give motion to the coffers, of which there are two exactly of similar dimensions suspended and connected together by strong chains. *Mr. Chapman's* concise description of this invention is so much to our purpose, that we beg to use his words, who says, "the doctor there observes, that, for all the purposes of commerce, no more width of boat is requisite than four feet, or more than two or three feet depth; and that the length might be indefinite, so as not to be inconvenient for ascending and descending between any two levels of canal, which he proposes to be done in the following manner, viz. that the lower level be

run up to nearly under the end of the upper, and terminate by an upright end and two side walls of masonry, to the full height of the fall, with a pier in the middle dividing the passage between the two side walls into two openings of rather greater width than the boat; the two ends of this pier are to be elevated so as to sustain the axis of a wheel, of a diameter equal to the width of the pier, and half of each opening. A chain passing over the wheel suspends from each end a rectangular case, so hung, that when one shall be at the bottom ready for a boat to float into, the other shall be at the top, and close pressed to the wall or frame at the end of the canal, so as to prevent the escape of water; then, by opening a stop-gate at the end of either canal, and another at the corresponding end of the case, it is obvious that the boat may float in or out. The lower boat and case (or case with water only) are then in a kind of lock just containing the case, and of sufficient depth to permit it to descend to the level of the lower canal. From this lock there is a conduit to keep the water down below the canal bottom. These are the outlines of the invention, which, where the connection between the two levels is a precipice, or so steep as to require only a short tunnel to the well or pit, up or down which the boats are to move, may, on receiving such improvements as it is capable of, be easily carried into effect for small boats, for which the author alone proposes it. It is obvious that under other circumstances, as to situation, the expences of high embankments above, of deep sinking below, and of bringing up the conduit to lay dry the lower locks, must more than counterbalance any advantage than can be derived from it." Where the fall is considerable, the doctor has proposed a balance chain, of the same weight per foot as the suspending one, to be hung from each coffer or case. See *Repertory*, vol. ii. p. 21.

On the 24th December, 1798, *Mr. James Fuffell* took out a patent, (see *Repertory*, vol. xi. p. 7.) for a method differing in principle from that of *Dr. Anderson* above described, only in having an axle and two wheels thereon, at a distance from each other on the middle pier, and under his coffers or receptacles, similar axles with a pair of wheels, and instead of his coffers or receptacles being suspended from the two ends of a chain passing over the wheel, as in *Dr. Anderson's* method, *Mr. Fuffell's* two chains are fixed to the tops of the side walls, passing under the wheels of his receptacles, and over the wheels and axle on the middle pier. He also describes rollers or guides by the sides of his lock-pits to steady the receptacles, and a toothed wheel on the middle shaft or axle connected with a fly or brake wheel to regulate the motion of the chains and receptacles; he also proposes the gates or latches at the end of his receptacles, to be balanced by counterweights, and to draw down into a cavity prepared for the purpose, when a boat is to be passed in or out, instead of drawing up. And if the fall be very considerable, he suggests the propriety of a short tunnel or arch to conduct the lower canal into the lock-pit, instead of an open notch or perpendicular walled cut in the hill for the lower canal. It appears that this balance-lock of *Mr. Fuffell's* was put in practice, or at least tried, on the *Dorset and Somerset canal*, near Froome, on the 6th of September, and 13th of October 1800, on a 21 feet fall, and with boats of ten tons burthen; delays in completing the above canal, and forming a communication, prevented this lock from being made use of for a long time afterwards; but we believe that the note of a late writer on the above experiments, stating that a subscription was set on foot in 1802, to raise money to make a lock in this very place, originated entirely in mistake.

On the 18th of March, 1794, Messrs. *Rowland and Pickering*,

ering, took out a patent (see *Repertory*, vol. i. page 81.) for a coffer or cradle similar to those described in *Anderson's* and *Fussell's* methods above, but which, instead of being suspended from or on chains, is, in this method, supported on pillars by a large diving-chest or caisson, sunk in the water of a pit or well underneath, the whole being so balanced, that the cradle can be brought to coincide either with the upper or lower canal, when boats are to be floated in or out of the same. Mr. *Chapman's* short description of this invention is as follows: "Messrs. Rowland and Pickering's plan of enabling great boats to ascend and descend with inconsiderable waste of water, consists in having at the head of the lower level of canal, a pit sunk as much below the bottom of it as the difference of height between the two levels, added to the depth of a covered caisson of requisite magnitude. This caisson, when immersed in the water, with which the pit is filled to the level of the bottom of the canal, is to support on wooden or iron pillars, of height equal to the fall between the two levels, a trough or cradle with gates or draw-doors at each end, containing a sufficient depth of water, to which the floating power of the caisson must then be in equilibrio, and consequently capable of moving with ease between the top and bottom of the pit. When the surface of the water of the cradle is level with either of the canals, and the end of it is closed against the framing of the gate of the canal by screws or other means, and the water let in to fill the vacancy between the gate of the cradle and that of the canal, they both may then be opened, and a boat be admitted to pass out. Excepting what may if necessary be used for regulating the equipoise and change of motion; the intermediate water between the gate of each level and that of the cradle, is all that is consumed, and with draw-doors to the cradle and single gates to each level as already premised, the quantity must be very trivial. The weight of water displaced by the bulk of the pillars sustaining the cradle need not be material; and where requisite, it is proposed to be counterbalanced by weights acting on a spiral wheel. This plan, which possesses ingenuity, and is applicable in many instances, is now carried into execution on the *Ellesmere* canal, near Ruabon, in Denbighshire, on a fall of 12 feet, and for boats of 70 feet length and 7 feet width; the whole is moved up and down by a rack and pinion towards each end of the machine." We may add, that *Rowland and Co.'s* patent describes four ropes to be attached to the corners of this cradle in some instances, passing over pulleys in a framing above, to which weights are to be suspended for assisting the buoyancy of the caisson, or even in some instances to supersede its use altogether, in balancing and moving the cradle up and down. The three methods last described, as the inventions of *Anderson*, *Fussell*, and *Rowland and Co.* are called *Balance-locks*.

On the 19th of June, 1792, Mr. *Robert Weldon* took out a patent, (see *Repertory*, vol. ii. page 235.) for a *Caisson-lock*, consisting of a long covered and close caisson or trunk, with close shutting doors at its ends, in which water enough is contained for a boat to float into it, when it coincides with the surface of the water of the upper canal; when being shut in, this caisson or diving-trunk containing the boat, is to be sunk through a deep pit to a door or valve opening to the lower canal, and the end of the caisson being fixed closely and exactly against the opening of the same, it, as well as the door of the caisson, is opened and the boat passes out into the lower canal, and the apparatus is then ready for another boat to enter and ascend in like manner. Mr. *Chapman* thus describes one of these caisson-locks for a fall of 45 feet, and for boats of 72 feet length and 7 feet width: "The caisson or chest is cylindric, and in this in-

stance of sufficient strength to bear the pressure of a column of water 45 feet or upwards, to which it is subjected when opposite the lower level, on account of the necessity of its being covered when opposed to the entrance of the upper level. It is so balanced, that when it has sufficient water within it to float a boat, it is of the same specific gravity as the medium it floats in; and, like an air balloon, it ascends or descends by a slight increase or diminution of its relative gravity, which, in this machine, is done by raising out or admitting an inconsiderable quantity of water. The pit in which the diving chest moves, has, opposite each level of canal, a tunnel or opening closed with gates, and is so much higher than the upper canal as to contain a height of water just sufficient, as already mentioned, to cover the caisson when opposite the upper level. In this or in its lower position, when run close to and abutting against the entrance, it is retained by the water being let out of the short part of the tunnel between the gates of the level and the end of the caisson. It is then held there by the pressure of the column of water intervening between the surface of the water and that of the canal to which it is opposed. The gates of the level of the caisson are then opened, and the boat goes in or out; and on the gates being again closed, and the water let into the vacancy, the diving chest is ready to proceed to the other level. This scheme possesses much originality, and may often be usefully applied." The patent describes racks and pinions, or chains and pulleys, for regulating the motion of the caisson in its ascent or descent through the water, and describes the gates of the upper and lower level of the canal, as sliding up into proper recesses by the motion of a rack and pinion, when the caisson by setting opposite it, has removed the pressure of the water in the lock-pit, and that pumps are to be used by the boatmen, who are shut up in the caisson on board their boat, for expelling or admitting water to lighten or weight the caisson, and air-pipes to prevent accidents by the want of fresh air, in case of any delay while the caisson with the men in it are under water. It appears, that the first of these caisson-locks was erected in 1794, for an experiment, by the side of the canal at Oken Gates in Shropshire; and that about August 1796, one was begun in Combe-hay, on the Dunkerton branch of the *Somerset* coal canal, having the fall and dimensions above described; about December 1797 it was completed, and was several times tried and boats and men passed through it, among whom was Mr. *William Smith*, the resident engineer; the trials continued occasionally during the spring and part of the summer of 1798, the canal not being ready for its being used by the trade; when it was discovered, that the walls of the lock-pits had not been constructed with the requisite care by the contractor and inventor under whose directions they were built, but the water had got behind them, and on drawing off the water to make some alterations, they bulged so much, that the whole was rendered unsafe and useless. After which the company substituted inclined-planes for removing coals, &c. in boxes to other boats at this place; but since which, locks have been constructed in their place.

Before we quit those contrivances in which a boat and its lading are to be transferred floating in water, we have to mention an ingenious suggestion of Mr. *William Chapman*. He proposes, (*Observations*, p. 85.) that a caisson containing water and a boat thereon should be drawn *side-ways* up a steep inclined plane, to be counter-balanced thereon by weights, or water-tubs descending down pits prepared for that purpose, or by another similar caisson on another plane. We find also in Mr. *James Fussell's* patent (*Repertory*, vol. xi. p. 12.) the mention of caissons with boats floating in them,

them, being raised and lowered by the double chains of his particular construction, on double inclined planes, wheels, axles, &c.

The *construction of Inclined Planes*, on which boats are to be drawn up or let down from one level of a canal to another, appears to have been long known in China. Between the upper and lower levels of their smaller canals, a double glacis of smooth hewn stone is constructed; the principal slope of this extends from the bottom of the lower canal to a little above the surface of the water in the upper canal, and terminates in a large beam of wood across the plane, the top of which is rounded and made very smooth, from which another similar plane of stone descends to the bottom of the upper canal. The bottoms of their boats appear to be flat, and constructed so strong and smooth, that a boat and its lading can be dragged up one of these planes, and lowered down the other, in order to pass forwards on the canal. The amazing populousness of China rendering manual labour very cheap, men are employed in incredible numbers for working their canals; a rope is said to be hove round the stern of a boat that is about to ascend one of these planes, and by means thereof she is dragged up the plane either by hauling directly at the rope, or by passing its ends round capstans erected for the purpose on the banks of the larger planes, to the bars of which the men apply their strength. When the boat is brought to an equipoise on the cross-beam, another rope is dextrously slung round the head of the boat by means of which it is eased or let down without violence into the upper canal; the same process is used in descending. It seems a matter of doubt, whether cradles or rollers of any kind are used under the bottoms of the Chinese boats, while they are passed over their inclined planes, as the latest accounts of travels through that surprising country, make no mention of such. Water-wheels have also been described by some as in use there, for raising and lowering their boats, instead of capstans worked by men; but of this also there are perhaps reasons to doubt.

The *Ponts aux Rouleaux*, or rolling bridges, which are particularly described in a tract printed at Paris, in 1693, are said then to have been practised for some time in Holland with success, particularly on the canal between Amsterdam and Sardam. This kind of inclined planes had rollers at short distances, over which, by means of a water wheel, the boats were hove up to the ridge separating the two waters, a little higher than the upper one, and were launched or let regularly down to the other. Mr. Chapman observes, that the boats in this and the Chinese method, could not be very long, because, although here in ascending or descending the inclined plane, they might bear upon many rollers; yet, in the change of position from the regular line of ascent, they must obviously bear upon one roller, and be liable to strain.

Mr. Davis Dukart, an engineer in the Sardinian service, was, as Mr. Chapman informs us, (*Observations*, p. 5.) the first who introduced inclined planes into practice in the British dominions; he resided in Ireland for some years previous to 1777, and was engaged in the Tyrone collieries near Dungannon, which are situate about three miles distant, and 200 feet above the level of the canal connecting with Lough Neagh; the sums granted by government being inadequate to the construction of locks for so great an ascent, Mr. Dukart turned his attention to small boats and inclined planes, of which he constructed three, connected by narrow canals. The falls were 70, 65, and 55 feet, which last terminated about 15 feet above the canal; to which, by a short rail-way, his boats, again floating over a carriage, were drawn onwards to the wharf; and there, being supported on

geers and frames, the boats were turned over to discharge their cargoes. This first attempt differed from the *Ponts aux Rouleaux* in no other respects than having a double passage down the inclined planes, so that by means of a rope leading over a wheel, his loaded boats drew up his light ones; but finding various inconveniences, from some of the rollers not turning, and from the individual irregularities of the diameters of others throwing his boats to one side, as well as from other causes; he suggested and put in use an inclined plane with two parallel rail-ways; up and down which, by the aid of a rope passing over a wheel at the head of the plane, his boats alternately passed, upon a cradle with four wheels, over which his boats were floated at each extremity of the fall. The loaded boat (the trade being a descending one,) drew up an empty one; for drawing the boats out of the upper canal on to the ridge, terminating the descending plane, he used a horse-gin. A few boats only were thus passed, by way of trial, before the works were suspended, and Mr. Dukart's death happening soon after, all of them were laid aside, and since that period a rail-way has been substituted instead of the canals and inclined planes.

Mr. Edmund Leach contrived an inclined plane in the year 1774, five of which he recommended to be used on the *Bude and Launceston* canal, and two of them on the *Liskeard* canal, (see his *Treatise on Inland Navigation*;) he also presented a model of his inclined planes and apparatus, to the Society of Arts, in whose repository, in the Adelphi, it may be seen by any person. This contrivance consisted of a double inclined plane furnished with rollers, from the bottom of the upper canal upwards to a ridge or cross beam, then of a short platform or level part, from which the same kind of double inclined plane, except that these were without rollers, descended into the lower canal for a considerable depth. On each of these inclined planes, a cradle or frame for receiving the boat upon rollers in an horizontal position was placed; and under this cradle was fixed a large water-tight chest or caisson, with a valve in its bottom and an air-hole at top, so that when the cradle and chest were let down into the lower canal the chest filled itself with water, to act as a counterpoise, and regulate the motion. These chests were of such a form, that when the cradles on the tops were in an horizontal position, the sides of the chests adapted themselves to the inclination of the planes, and they had several rollers fixed in their sides to lessen the friction in moving up and down the planes: to the upper corner of this chest a strong frame was hung with hinges like a door; this frame had rollers fixed on both sides of it, and was so contrived, that when the chest and cradle were ascending the plane with a boat upon them, this frame rested on the inclined plane, and prevented by its rollers any friction from the head of the boat against the plane; when the boat had arrived at the top of the plane, this moveable door fell into an horizontal position, and just covered the platform above-mentioned, when the boat was at liberty to be moved forwards on the rollers of the cradle and door, by means of a rope and capstan, to the cross-beam, and from thence it could by the same means be lowered easily down upon the rollers of the upper plane into the upper canal. The two chests and cradles above described were connected by means of strong ropes, which wound round an horizontal axis fixed in a strong framing above the top of the planes, so that one of the cradles would always be sunk into the lower canal just deep enough for a boat to float on to the cradle, at the same time that the other chest and cradle were at the top of the other plane, and its door lying on the platform as above described. A water-wheel was to be provided, with cog-wheels connecting with

the axis or barrel for the rope, to give motion to the ropes and cradles with their contents, when a sufficient quantity of water had been let into the upper chest by a valve and pipe contrived for the purpose, or out of either of the chests by means of a string attached to their valves, till an equilibrium of the two chests, cradles, and boats upon them were obtained. By this apparatus it was proposed, that in general one boat should be ascending upon one of the planes while another descended on the other; but the caissons were large enough to admit of sufficient water from the upper or lower level being taken into one of the chests, to balance a loaded boat on the other. The capitan worked by men was proposed to be used, for dragging boats out of the upper canal over the upper plane and platform on to the cradle in order to descend. Walking-wheels, to be worked by men, were also proposed instead of water-wheels, where the water was very scarce in the upper canal. The canals above-mentioned were never carried into execution, although an act of parliament were obtained for the former, nor have we heard of any of Mr. Leach's planes being brought into actual use.

Mr. William Reynolds, of Ketley, in Shropshire, was the first who contrived and executed an inclined plane (which was completed in 1788) for the passage of boats and their cargoes, which was found fully to answer, and continued in practical use. Mr. Thomas Telford has thus described the same, in *Plynley's Agricultural Report of Shropshire*, p. 291. Mr. Reynolds "having occasion to improve the mode of conveying iron-stone and coals from the neighbourhood of the Oaken-gates to the iron-works at Ketley, these materials lying generally at the distance of about a mile and a half from the iron-works, and at 73 feet above their level, he made a navigable canal," called the *Ketley canal*, "and instead of descending in the usual way, by lock, continued to bring the canal forward to an abrupt part of the bank, the skirts of which terminated on a level with the iron-works. At the top of this bank he built a small lock, and from the bottom of the lock, and down the face of the bank, he constructed an inclined plane, with a double iron rail-way. He then erected an upright frame of timber, in which, across the lock, was fixed a large wooden barrel; round this barrel a rope was passed, and was fixed to a moveable frame; this last frame was formed of a size sufficient to receive a canal boat;" these boats were 20 feet in length, 6 feet 4 inches wide, 3 feet 10 inches deep, and each carrying 8 tons; "and the bottom upon which the boat rested was preserved in nearly an horizontal position, by having two large wheels before and two small ones behind, varying as much in the diameters as the inclined plane varied from an horizontal plane. This frame was placed in the lock, the loaded boat was also brought from the upper canal into the lock, the lock-gates were shut, and on the water being drawn from the lock into a side-pond, the boat settled upon the horizontal wooden frame, and as the bottom of the lock was formed with nearly the same declivity as the inclined plane, upon the lower gates being opened, the frame with the boat passed down the iron rail way on the inclined plane into the lower canal, which had been formed on a level with the Ketley iron-works, being a fall of 73 feet. Very little water was required to perform this operation, because the lock was formed of no greater depth than the upper canal, except the addition of such a declivity as was sufficient for the loaded boat to move out of the lock; and in dry seasons, by the assistance of a small steam engine, the whole of the water drawn off from the lock was returned into the upper canal, by means of a short pump. A double rail-way having been laid upon the inclined plane, the loaded boat in passing down brought up another boat, containing a load nearly equal to

one-third part of that which passed down. The velocities of the boats were regulated by a brake acting upon a large wheel, placed upon the axis, on which the ropes connected with the carriage were coiled." It appears that this plane has an inclination of about 22° , except near the extremities, where it diminishes to about $11\frac{1}{2}^{\circ}$; and that about 400 tons of coals usually descend thereon daily. In 1789 a copper medal, or halfpenny, having a representation of this plane on one side, and of the cast-iron bridge at Coalbrook-dale on the other, was struck, and issued by the Coalbrook-dale company. Since the practicability of inclined planes has been established, by the success of the Ketley plane, but few acts have been passed for new canals, without a clause authorizing the company to erect inclined planes, instead of locks, if they should be found most advisable. Before proceeding to mention the inclined planes of different constructions, which have been since made or proposed, we shall notice the under-ground plane at Walkden Moor, which was completed in October 1797, upon *Bridgewater's canal*, it being so similar to the Ketley plane above described.

The *Duke of Bridgewater*, in the year 1800, caused an account to be presented to the Society of Arts, in the Adelpi, London, of the inclined plane which he had erected and brought into use, under the direction of his agent, Mr. Benjamin Sothorn, between two different levels of his tunnels or subterraneous canals from Worsley near Manchester; for which the Society voted his grace their gold medal, and published plans and sections, and an account thereof, in their 18th volume of *Transactions*; to which we refer, only mentioning, that this plane, which is $35\frac{1}{2}$ yards high, and 151 yards long, through an inclining tunnel hewn in the solid rock, at near 60 yards below the surface of the ground, differs from the Ketley plane, in having, upon about 57 yards of the lower end of the plane, a single rail-way only, to or from which the two rail-ways above join by easy curves, to proceed up to the locks by one rail-way, or down by the other. A winch and pinion are provided, to be occasionally worked by two men, into cogs in the large brake wheel, for setting the boats in motion. Rollers are placed between the iron rails, for the slack part of the great ropes to run upon, and for further preventing the wear of these ropes, they are lapped round with a small cord. About 12 tons of coals are let down in each boat, and a boat and cradle on which it runs, weigh about 9 tons more. About 16 minutes is consumed in passing a pair of boats: the boat-cradles are 30 feet long and $7\frac{1}{2}$ feet wide, moving on 4 iron rollers. A small bell gives notice from the bottom to the top of the plane, when the boats are placed on the cradles, and the machine ready to work. The water of the locks is let down by a paddle, through a perpendicular shaft, to the middle canal, and acts as a water-bellows to force fresh air down into the extensive tunnels and works that are on the lower level. The upper gates of the locks turn in hollow grooves like a common lock, but the lower gates draw up in grooves, by means of windlasses, to let the boats pass out or in when the water is let off.

Mr. William Reynolds has the honour of introducing another sort of inclined planes, on the *Shropshire canal*, where there are three planes in use of 120, 126, and 207 feet rises! The act for this canal passed in 1788, and it was completed, under the direction of Mr. Henry Williams, as resident engineer, and opened in 1792. These planes are upon the same construction as those at Ketley, except that there are no locks at the top of the descending planes, but the same are continued above the surface of the water in the upper canal, and terminate in a cross beam, from which another plane and rail-way descend into the upper canal: this is for avoiding

avoiding the waste of water which locks at the top of the planes occasion. A small steam engine is used for working the axis of the rope barrel, at some distance from which, on the upper side, there is a large pulley or wheel, fixed at a proper height, for the great rope to pass over, to draw the boats up or let them down the long descending plane; another smaller axis and rope barrel are provided, which can, like the larger one, be cast in or out of the engine-geer at pleasure; this last is used for hauling the boats up the short ascending plane, from the upper canal. The engine can also be used to draw empty boats occasionally up the long plane, in case such want to pass, when there are no loaded ones ready to descend, and draw them up, as we have before described. The wheels or rollers under the cradles appear on these planes to be equal in diameter, and not of different sizes, so as to bring the two ends of the boat to a level, as on the *Ketley*; they do not, therefore, appear applicable to very steep planes or to long boats. On the windmill plane, which is 600 yards in length, and 126 feet rise, six boats have been passed down, and six taken up within the hour, the steam-engine and three men only being employed: the boats here are of the same length and breadth as on the *Ketley*, but shallower, so as to carry but five tons; and such boats are said to be passed down these planes for three pence each, and the empty boat taken up gratis. At Wombridge on the *Shrewsbury* canal, Mr. *Thomas Telford* has since erected a plane, 223 yards in length, and 75 feet rise, exactly on the same construction as the above, of which an account, with plans and sections, may be seen in *Plymley's Report*, p. 294.

On the 18th of June, 1793, Mr. *Josua Green* took out a patent for the use of double inclined planes and rail-ways, on which cradles for the boats are to be used, consisting of a frame of wood, and the bottom corded by strong ropes across each other like the common bedsteads, that the boat may not be strained; in order to introduce wheels of four feet diameter for the cradle to move upon, a strong frame is to surround the cradle, and be firmly bolted to it, but leaving an interval sufficient for the four or more wheels to move between it and the cradle, by which the axles can be fixed to the wheels, and work in gudgeons at each end, with less friction than common wheels or rollers. To his brake-wheel handspokes are adapted, for men to assist in setting the machine in motion, instead of a winch as before described on *Bridge-water's*; the ropes are to be capable of adjusting to the proper length as they stretch or contract, by a screw or otherwise. A third inclined plane is directed to be made, for the purpose of carrying a counter weight or vessel, whose rope is to pass over another axis with a brake and handspoke wheel, for hauling the cradles and boats out of the upper level to the ridge or cross beam, or to ease them down into the same. He recommends spare vessels laden with water to be in readiness to pass up or down the opposite plane, as a counterpoise to any single loaded boat that may arrive at the plane. Also that single planes, and with less inclination, may in some instances be adopted. See *Repertory*, vol. v. p. 11.

Earl Stanhope, in the year 1793, in recommending the *Bude and Hatherleigh* canal, proposed, between the different ponds or water-levels of the intended canal, to have iron rail-roads of gradual and easy ascent, on which boats of two tons were to be used, suspended between a pair of wheels of about 6 feet diameter, and to be drawn up or let down the same by a horse, in order to be launched in the upper or lower water-level or canal.

On the 8th of May, 1794, Mr. *Robert Fulton* obtained a patent for the use of a double inclined plane, whereon

cradles having cisterns or caissons under them, no ways different from Mr. *Leach's* above described, except that the boats were in some cases to be taken on to the cradles *side-ways* instead of length-ways; this was proposed to be accomplished by short inclined planes, on which the boats, upon wheeled carriages, were to be dragged out of the upper and lower canals by means of ropes working on the axles of water-wheels; a brake is to be used for regulating the motion of the boats and cisterns, when brought nearly to an equilibrium by the valves; brace-blocks, or pulleys, to be used for shortening or lengthening the large ropes when necessary. See *Repertory*, vol. vii. p. 222.

Mr. *William Chapman*, at page 85, of his *Observations*, which were written principally in answer to Mr. *Fulton's* treatise, suggests this *side-way* motion of boats on inclined planes, as before-mentioned, not knowing, as we apprehend, of Mr. *Fulton's* patent above-mentioned, because it was not published till 1797; and it is indeed singular, that Mr. *F.* should, in 1795, have written 144 quarto pages on the subject of canals, and not once have given a hint of his having taken out a patent in the year before for some of the principles therein explained, and so highly recommended; nor does his long letter in the *Star Newspaper* of the 30th of July 1795, announcing this work being in the printer's hands, make the least reference to his patent. The Board of Agriculture must, we are confident, have been equally in the dark, in March 1796, or they would not have given Mr. *R.* the opportunity of puffing into notice, a subject wherein he was a patentee through their means. We beg here to remark, that our duty, in treating this part of our subject, seems to require the mention of all the inventions and methods which have come to our knowledge; and though we should have more pleasure in making known the inventions of those who lay the same at once open to the community, yet, as all of these will be so in a few years, we have not thought it right to exclude or be less particular in the mention of, inventions or contrivances so circumstanced: but to give the dates of such patents wherever we could, that their termination (at the end of 14 years) may be known.

Mr. *Robert Fulton*, in his 4to. work, entitled a "Treatise on the improvement of Canal Navigation," published in London in 1796, with many plates, has proposed the use of narrow canals and inclined planes, on which small and shallow rectangular boats are to be used, having low wheels, or rather trucks fixed underneath their bottoms; he proposes to have on his double inclined planes, an endless chain passing up the track of one plane and down the other, round or over wheels that are of the proper size and fixed in proper places and directions at top and bottom of the planes to suit the swag or curvature of the leading chain; these are made to revolve at pleasure, with power sufficient to drag a loaded boat up one of the planes, (by means of a short double chain belonging to the boat which is to be hooked into, and will at the proper time discharge itself from the leading chain), by means of toothed gear attached to the upper wheel, on which there are flubs to prevent the chain from slipping; which connect with a water-tub descending in a perpendicular shaft, discharging itself at bottom by means of a valve, and returning again to the top, when cast out of gear, by means of its counter weight, balance-chains, and fly, ready to be again charged with water from the upper canal. The motion of the whole is regulated by a pair of fanners or an expanding fly; a smaller axle and cog-wheel are provided, working into the tub-shaft gear, when necessary to draw the boats up a short plane that descends into the upper canal, on to a bridge or curving

curving top which unites the two planes, a stop being provided to retain the boat in its proper position, while this last chain is discharged, and the boat-chains are hooked into the leading chains as before mentioned. When a descending boat happens ready to draw another up, or a single one requires to be let down, the tub-geer is to be cast off after the boat has been dragged on to the bridge thereby, and the fanners are to be trusted to for easing it down. Mr. *Chapman*, who reviews this system, justly objects to the smallness of the boat-wheels, and recommends that larger ones should be used in a water-tight case or groove in the floor of the boat. Owing to the endless chain, Mr. *Fulton* says, that during part of the descent of a boat, the power thereby acquired may draw another boat out of the upper canal on to the bridge; and a boat may in some cases be kept ready in that situation to begin the work; or, he proposes a common windlass tooth and pinion to be used for that purpose. For protecting delicate goods in his boats, he proposes a frame above the boat for supporting the leading chains; and for transferring light timber that is too long for his boats, he proposes rafts to be made with a carriage under them, having wheels like those of his boats, by which these rafts are to be conveyed on the inclined planes. A totally descending trade will not require the tub-shaft, tub or its geer; and the same may be added without interrupting the trade, when at any future time it shall become an alternate one.

Mr. *Fulton* next describes (page 71.) his single inclined plane for great heights; here, his wheel-boats are to ascend and descend on the same rail-way on his plane; the leading chain winds round a barrel or drum, that can, by means of geer that casts in and out, be moved with two different powers and velocities, by a water-tub working another barrel at the head of an upright shaft as before described; or the tub-shaft geer can be entirely cast off, for the tub to ascend, or for a boat to descend on the long plane, regulated by a brake or fanner as before mentioned. Mr. *Fulton* proposes his leading-chain, wheel or barrel, to be so placed over the bridge between the upper and lower planes, and with a roll or small drum below it, that the leading chain hooked to one end of the boat may drag it out of the upper canal on to the bridge, and lower it down from thence without unhooking, and the same in ascending. Mr. *Fulton* (at page 76.) proposes for smaller rises, instead of a tub-shaft, tub or its geer, to erect an overshot water-wheel, to be supplied from the upper level, with proper geer, and a drum for one end of a chain to wind round, the other, after passing over two pulleys at the head of a plane, (one pulley would answer better, by placing the water-wheel or its drum oblique to suit the same) to be hooked to the stern of the last of three or more boats that are to ascend, each of the boats before it being in like manner hooked by their own chains to the leading chain, according to the weight of the boats, and the power of the water-wheel; when water is let on to the wheel, these are to be dragged up, and discharge themselves one by one, and slide down into the upper canal; boats are to be dragged up, single or more than one, out of the upper canal on to the bridge, and when they begin to preponderate towards the descending plane, the water is to be stopped from the wheel, which is to be allowed to turn backwards, and act as a fly or regulator to the velocity of the boats in their descent. The water-wheel will not often admit of being supplied from the lower level, as Mr. *Fulton* has suggested, on account of the great expence or the impracticability of a drain or fough to discharge its water; the same difficulties, as Mr. *Chapman* has observed, attend several of the tub-shafts which Mr. *Fulton* has proposed, for the perpendicular lift of boats from one level of a canal to another, of which we shall treat hereafter. At page 37, and

fig. D, in his 5th plate, Mr. *Fulton* has recommended his wheel-boats, to be used, on a single ascending plane to a coal-pit mouth, to be drawn up the same by a chain winding on a drum, worked by the mine-engine, and lowered down the same by means of a brake attached to the drum.

On the 2d of August 1796, Mr. *John Luke* took out a patent for an inclined plane, on which boats in a cradle are to be drawn up, by the descent of a water-tun on another plane, assisted by a water-wheel in certain parts of its motion, or in scarcity of water, by a hand winch. See *Monthly Magazine*, vol. ii. page 652.

Mr. *William Chapman* recommends an improved kind of inclined plane in his *Observations*, &c. of which he has given an account at page 96., "by making the descending and ascending way continuous, like Mr. *Fulton*'s; and having a lock at the head of the descending way, long enough to contain a separate carriage for three or four boats (or so many as form what has been called a conjoined boat). These boats, on descending, would draw another gang light, or half loaded upwards, over the top of the ridge, no lock being requisite on that side. The chief objections to this, lie in the vast weight of a gang of boats, which, in a steep angle of descent, would require a very heavy rope, and in the difficulty of returning the carriages to their proper place. The latter may be got over by keeping the two ways at a little distance, and joining them above and below by a semi-circular rail-way for the carriages; coupled to each other (in such a way as to suit the different boats that are to rest upon them, and yet admit of the necessary extension, when the boat came over the concave part of the inclined plane, which may be affected by a worn spring) to run along under water, after they have parted with their vessels. Both in this and the method last described, the water contained in the lock may be drawn off into a reservoir, at the head of the inclined plane; in this reservoir, or a pond communicating with it, may be fixed a broad undershot water-wheel between the two rail-ways, to retard the motion of the descending boats and throw back the water. This wheel may run in a close case, and be divided round its periphery by different shroud boards, forming so many wheels that one or more portions of its width may be employed at the same time in throwing up water according to the necessity of the case, to be determined by the velocity of the descending boats, which by means of a centrifugal regulator" (the flying-balls or governor used in Bolton's engines, windmills, and other machines,) "will open one or more of the penstocks to let water below the wheel, or shut them all as occasion may require. The reservoir under the wheel should of course never be exhausted, but when drawn down to a certain extent should by a floating weight or any other method let in water from the head canal. These means will answer for a descending trade, and if the ascending trade be more than the other can draw up and water be deficient, recourse may be had to a steam-engine."

We have thought, that a different kind of lock at the top of an inclined plane might be used with advantage, composed of a rectangular box, water-tight, except one end, which should be open, and having wheels under it of different heights, so as to support it upon the plane in an horizontal position, its size being just sufficient for a boat to float into it. The end of the upper canal should terminate in a single lock-gate, the outside border or edges of which should be leathered, or covered with list; so that when the carriage or cradle above described is drawn up to the top of the plane, its open end should fix itself against the lock-gate opening, in a water-tight manner, by means of wedges or screws prepared for the purpose of confining it; a small shuttle in the lock-gate might then be opened to admit

water

water to fill the cradle, making it act as the chamber of a lock; the lock-gate being opened, a boat might enter the cradle, from which it would expel great part of the water into the upper canal again, if the boat and cradle were nicely adapted to each other; the lock-gate and shuttle should be again shut, when the water might be drawn off into a cistern, (to be returned if necessary by a water-wheel or any of the methods before mentioned), the cradle be unfastened from the lock, and be let down the plane by any of the regulators before proposed. For passing the boat out of this cradle at the bottom of the plane, the back or other end of the cradle might open, or, perhaps a better method would be to continue the plane deep enough into the lower canal, that the cradle, which should in this case be heavy enough to sink in water, might descend low enough for the boat to float out or in, over its end; side rails should, in this case, stand up from the cradle, to shew its place when under water, and for guiding and fixing the boat over it, with liberty to sink into the cradle, as it is drawn up the plane to the surface of the water.

Mr. Chapman informs us (page 7.), that for avoiding the friction of the gudgeons of rollers, when charged with the weight of a loaded boat on an inclined plane, *Earl Stanhope* has proposed, that rollers between the boat's bottom and a smooth plane should be used, moving or rolling with the boat, for half the boat's length; the rollers then to return to their places by means of weights acting over pulleys, and connected by a chain to the ends of each roller. Mr. *Fulton*, he says, proposes to use moving rollers, attached to, or going under and through the cradle that contains the boat, the gudgeons at the ends of the several rollers being passed through the links of an endless chain or collar, by which the rollers are returned in a cavity under the boat, that is resting in the cradle; this endless chain of moveable rollers for lessening of friction, appears to be claimed as part of *A. G. Echarde's* patent of the 31st of January, 1795, for various machinery: see *Repertory*, vol. ii. p. 365.

The principles of setting out canals, where inclined planes are to be used, are similar to those we have explained, in recommending several locks to be brought together to form a set of such, or a considerable fall in one place; it will, however, be necessary, in determining the place for an inclined plane, to choose ground which slopes as regularly as possible between the intended upper and lower levels; if any part of the ground for the intended plane is springy and disposed to slip, the springs must be cut off by effectual and durable under-drains. It will be better so to contrive the plane, if practicable, that little, if any, filling up of hollows shall be necessary in forming the plane, to avoid new made ground, which on a considerable declivity would perhaps slip, after heavy rains had saturated it with water; the foundations for the stones or bearers must also be carried through such new made ground, and into the firm-stuff. The stuff which is removed in forming an inclined plane, should be carefully levelled, or disposed of in holes, so as not to form spoil-banks, and be covered with the top soil previously taken from those places. In case a perpendicular shaft and fough thereto is wanted at the head of the plane, the knowledge of the *strata*, or matter which compose the hill, may be of considerable importance, in determining the best place for the mouth of the fough; which may not always be the nearest point at the proper level, to the intended shaft, if the *strata* or measures of the hill are various and dip considerably. The plane being formed of a sufficient width on the ground, a strong framing of timber braced across may be used, if good and durable hewn stone is not in plenty, fixed firmly down to a sufficient number of piles drove into the ground, the interstices between the framing

being filled with good rubble stone, or gravel rammed very tight down. On these frames two or four files or rails of sound oak, according as the plane is to be single or double, should be laid parallel and at the proper distances from each other, and firmly bolted down; and on these the slips or ribs of iron are to be evenly and smoothly fixed, for the wheels of the boat, or boat-cradle to run upon, and upon which they are to be confined from getting off sideways, by a rib standing up for that purpose, either upon the wheels or on the rails. If good stone is in plenty, it will be proper to cover the whole of the plane with ashler or well jointed stones, taking care that the courses across the plane at proper intervals are formed of large stones let some distance into and firmly bedded in the ground; and to these the cast-iron rails (that are used on good and durable planes) may be fastened by pins cast into a hole with lead. Or, if wooden rails are to be used instead of cast-iron ones, strong sleepers of wood should be worked into the paving of the plane at proper intervals, on which to bolt and fasten down the rails. Care should be taken, in all works of this kind, where large or hewn stones are used, to let no part of the mortices or holes which are cut in such stones remain open or unfilled with lead or cement, to prevent the rain filling them with water, which would in winter time expand with the frost, and in moist instances split the stone. It is unnecessary for us to point out to experienced engineers, the great care and precaution which ought to be used in works of this nature, to make every thing substantial and more than sufficient to sustain the weight or strain to which it will be subjected, and which ought in most cases, particularly the moving parts, to be previously calculated, and before the apparatus is put together for actual use, every rope, chain, framing, wheel, &c. &c. should be subjected to a greater strain than can occur in practice, to avoid the unpleasant, and perhaps fatal accidents, which might otherwise happen, by which a prejudice might at the onset be excited against the scheme, so powerful as to cause it to be laid aside without proper trial. It would much exceed our limits to enter fully into this subject, we shall therefore proceed to those other contrivances for overcoming ascent on canals, where boats have been lifted out of the water, or proposed to be, by a perpendicular ascent; after which, there will still remain to describe those methods which require the shifting of the cargoes of boats into other boats, or to rail-way waggons, &c.; first mentioning that on the *Shrewsbury* canal, an inclined plane is used for passing the boats over part of the ascent, while locks are used for the other parts; and Mr. *William Chapman*, at pages 54 and 99 of his *Observations*, &c. recommends whenever coals in large quantities, lime, lime-stone, or other minerals, are to be conveyed along canals, or are brought in by branch canals on a small scale, there being a scarcity of water which reservoirs cannot remedy, where it can be done in setting out the canal, in addition to the locks, to overlap the levels in a steep place, and communicate them by an inclined plane for boats (or a double rail-way for tram-waggons) leaving the lock communication to answer all the general purposes of commerce. The same author observes, that the portage of articles from one level to another, and carriage of the boat itself is still practised in various parts of North America, as the falls of the Mohawk, from the Mohawk to Wood Creek, at the falls of Orandaga, &c.; also at several places called Tarbets, in the Highlands of Scotland, as in Cantyre, Loch Lomond, Arrachar and Long, Jura, &c. Among the principal inclined planes for boats, are those of Hay, Windmill-hill, and Wrockardine-wood on the *Shropshire* canal, Walkden Moor on *Bridgewater's*, Ketley on the *Ketley*, Wormbridge on the *Shrewsbury*, &c.

On the 8th of May, 1794, Mr. *Robert Fulton* took out a patent

patent, as before-mentioned, in which he describes (see *Repository*, vol. vii. p. 227.) either a rectangular upright notch in the steep face of a hill, to the top and bottom of which the two levels of a canal are brought, or a large perpendicular shaft and tunnel at the bottom for the lower canal, through which notch or shaft boats are to be drawn up or let down, in a pair of water-tight cradles, suspended at the two ends of strong ropes of chains, that are to pass over pulleys fixed above the top of the shaft, and connecting with a brake-lever or wheel, to regulate the descent of a boat in one cradle, and ascent of another in the other, after they have been brought to an equilibrium by the letting out or in of water by proper valves. The boats are to be drawn into and out of the cradles, by short inclined planes, in the upper and lower canal, on which the boats on wheeled carriages are to be drawn by ropes winding on the axis of water-wheels, to be turned by water let out of the upper canal thereon; brace-blocks are to be used for adjusting the length of the great rope, and capstans may be used instead of water-wheels, for passing the boats on and off the cradles. Mr. *Fulton*, in plates 11 and 12 of his "Treatise on Canal Navigation," and his descriptions thereof (pages 97 and 100) has more fully described this method; and proposes for a descending trade, that the full boats should draw up the empty ones, and instead of inclined planes for getting the boats on to the cradles, a cage of iron should be used, into which the boats on the lower canal can be floated; and for discharging them into the upper canal, he proposes two lock-carriages, or large water-tight boxes, open at one end, moving on iron rail-ways, and which can be advanced by racks and pinions over the shafts, while the boat is suspended high enough to clear its bottom; the open end of this lock-carriage is made to fit, and be retained against the frame of a lock-gate at the end of the upper canal, (as in Dr. *Anderson's* and *Fussell's* methods, and the water-tight cradle which we have lately mentioned), when the water being admitted by a valve, to float the boat in the lock-carriage, to the level of the upper canal, the lock or draw-gate thereof is to be opened, and the boat floated out of the cage to proceed on the upper canal; to the pulleys or drum-wheel over which the chains act, a fly or fanners is proposed to be connected to regulate the motion; as also an axis with cranks to work pumps, by which the water that is drawn off again from the lock-carriage into a side reservoir may be pumped up again into the upper canal, that no water may be lost. For an alternate trade, to which it may be at first adapted, or the necessary parts applied afterwards, an additional shaft must be sunk, in which a water-tub is to be suspended, instead of another cage and boat, as a preponderating weight; this is to be filled out of the water reserved in a cistern that is drawn out of the sliding lock-carriage.

Mr. *Robert Fulton* (see his "Observations," p. 94. and plates 9 and 10.), particularly describes a species of Cranes, by which boats are intended to be drawn up, in an iron cage, through an upright notch or shaft, and by the motion of the jibs, are to be moved over the upper canal and lowered down to float thereon, or the reverse in descending; for this purpose a perpendicular notch or shaft for the boats, and another for a water-tub, as a counter-acting and motive force, is to be provided; a reservoir is to be formed by the side of, and about 8 feet from the bottom of the tub-shaft, into which the water discharged from the tub, when at top, can be conveyed by a proper valve and spout; provision is to be made, by valves and spouts, for filling the tub from the upper or lower level of the canal, as occasion may require; and a valve is to be provided, opening by a pin in its bottom, for discharging the water when it rests on the bottom of the tub-shaft; over the tub-shaft a drum is to be fixed, for the tub-chains

and crane-chains to wind round, and to this drum a fly or fanner is to connect by toothed wheels and axles, to regulate the velocity of the motion. The crane-chains are to be double, and proceed to two separate jibs fixed on centres, at proper distances from each other, having the ends of their jibs connected by a coupling-rod of the same length, by which they will always move parallel, and suit the distance of the hooks on the top of the iron boat-cage. For raising a boat out of the upper canal, the same being floated on to the cage suspended from the cranes or jibs, and the water-tub (to which balance-chains are to be adapted) being near the bottom, water is to be drawn, by a valve and spout, out of the reservoir into the tub, till it preponderates and draws the cage and boat out of the upper pound; the jib is then to be moved over the boat-shaft, and the water emptied from the tub by suffering it to descend a little farther and strike the bottom, when the boat will be lowered easily, by means of the fly, to the lower canal, where it can be floated out of the cage; and the reverse on ascending. If water is very scarce in the upper canal, and a fough or tunnel can readily be driven, for emptying the tub-shaft, the same may be made deep enough to draw water from the lower instead of the upper canal, for the preponderating power. We have not heard that any of these perpendicular lifts for boats have been executed, we shall therefore proceed to the other kinds of cranes and perpendicular lifts for the cargoes of boats.

Mr. *Bridge*, of *Tewksbury*, about the year 1759, contrived, for the navigation on *Stroudwater* river, a kind of cranes, with double jibs, that could be either used singly or together, and act as a balance to each other; these were erected on a strong walled bank, that separated the upper and lower levels of the river at the several mills. The boats to be used on each different level, or mill-stream and dam, were all of one size, and made exactly to suit and contain a certain number of strong wooden boxes, without any loft space. The goods or lading of the boats were placed in these boxes, and when they arrived at the first crane, one end of the chain thereof was hooked to a box, while the other was hooked to a similar box of goods in the other level, and by a peculiar structure of the crane, worked by two men at windlasses, both boxes were drawn up and suspended, somewhat higher than the bank of the upper canal, when the jibs were turned half round, and the boxes of goods were lowered down and replaced each other in the boats; the same operation was repeated with each of the remaining boxes, when each boat was ready to proceed with its new lading upon its own level to the next cranes. It can hardly be necessary to add, that the expence and delay of this method caused it to be soon laid aside.

Mr. *Edmund Leach*, in his treatise before quoted, proposes boats to be unladen and laden with boxes of goods as above, but to work the cranes by water-wheels, or by wheels for men to walk in.

The *Duke of Bridgewater's* tunnel from his canal into the coal-works at *Worsley*, after it had proceeded for a great way straight into the hill, came at a great depth to be under a small brook or constant stream of water, by the side of which a large water-shaft was sunk, and a drum and large brake-wheel erected over it, of sufficient size that a man who stands before the lever thereof has his two hands at liberty to pull the lines which connect with the valves, and give signals to those below, while by lunging, or stepping forwards, with his breast against the lever, he can in an instant stop the machinery in any part of its motion, or regulate the same at pleasure. There are two water tubs, which are very large and have a valve and pin to empty themselves quickly when they arrive at the bottom; they are suspended by large ropes

or cables from the drum, while other large ropes descend therefrom through another, or coal shaft, by the side of the middle or principal tunnel, into and over the navigable tunnel, which there is at, we believe, 60 yards lower level. On this lowest canal boats are used, similar in their dimensions to those above, and containing boxes, which being filled with coals at the several terminations of this canal, in the seams of coals; the boats are pushed along by means of rings that are fixed all along the roof of the tunnel, at the proper height for a man, who walks on the top of the coals, to lay hold of, and shove the boat along by. The boat being arrived under the coal-shaft, and one of the water-tubs being at the top of its shaft, the coal-rope answering thereto is hooked on to the box of coals, and the descent of the water-tub, immediately on the ringing of a bell, draws up the same to the level of the principal canal, where being drawn aside over an empty boat, it is lowered into the same by a slight reversion of the motion of the machine; when the interval of emptying the tub at the bottom by its valve, gives time for hooking another box to the other rope which is at the bottom, when the other water tub is filled, and the machine suffered to move, by the man who leans against the brake. This very complete and economic machine was contrived and erected by Mr. James Brindley, and it is so constructed, that when coals are not drawing, the alternate descent of the water-tubs work some very large pumps, which are sufficient to lift all the mine-water of the lower level into the middle canal and keep the lower canal always at the proper height for navigation.

The same tunnel of *Bridge-water's* canal being continued a great way further into Worsley hill, till under Walkden moor, another subterraneous canal or tunnel there begins, at 25½ yards higher level, this last being near 60 yards from the surface; from the surface two shafts were sunk, one terminating in and over the upper tunnel or canal, and the other in and over the middle or principal canal; there is another canal still lower, which we have been last speaking of, after passing close by the canal above: between these shafts a large drum was erected on the surface, with a brake wheel and a pair of strong ropes. Two boats being arrived at the shafts on the upper canal, one of them loaded with boxes of lime-stone, that was wanted at the surface, and another with boxes of coals intended to be transferred into an empty boat in the middle canal; the ends of the two ropes were fastened to a box of coals and a box of lime-stone, when the superior size and weight of the coal-boxes drew the lime-stone to the surface, to be there landed and deposited, at the same time that the box of coals was deposited in the lower boat, ready to proceed on the canal to Manchester or other places. This method was in 1797 superseded by an inclined-plane for letting down the boats laden with coals, from the higher to the middle level, and returning the empty boats and boxes, as we have before-mentioned. At Brierly-hill, near Coalbrook-dale, the extremity of a branch of the *Shropshire* canal, great quantities of coal and iron in crates made of iron were let down one of two shafts, which connected with the termination of the canal above and the ends of a rail-way in a tunnel below, from which lime-stone in similar crates was drawn up the other shaft to be placed in the boat; a large barrel and brake-wheel were fixed between the tops of the shafts, and cranes with jibs, by which the crates could be raised and moved from the boat over the shaft, or the reverse; these shafts, which were 120 feet deep, were not found to answer, in point of expence, so well as inclined planes, and Mr. Telford informs us (*Phymley's Report*, p. 296 and 307.) that inclined planes have been substituted, on which crates of coal, or iron pigs, or goods, descend and draw up other crates

containing lime-stone, for the use of the iron-works above, by means of ropes, a drum, and brake-wheel, with a much less portion of manual labour, and more expedition, than was done by the shafts above-mentioned. Near Lillishall lime-works, on *Donnington Wood* canal, similar shafts were once used, but are now superseded by an inclined plane. At Coombe-hay, on the *Somersetshire* Coal canal, after the trial of Mr. Weldon's diving caisson, inclined planes for descending boxes of coals were erected, and used for some years; but the delay and expence were found so great, that the company effected the purchase of some mills, and under a new act of parliament, erected 22 locks in place of these inclined planes. Having finished with the different kinds of inclined planes, and other ways of procuring the ascent of boats or their cargoes, we proceed to those which are used for overcoming the principal or sudden ascents on rail-ways or tram-roads; whereon waggons or trams are used for the conveyance of goods, the same being drawn on the level parts or easy ascents or descents by a horse, as we shall describe shortly.

Mr. John Buddle, in the *General Magazine* for 1764, page 285, has given a view and description of the coal-waggon which had been then long in use on the wooden rail-ways in the neighbourhood of Newcastle upon Tyne. This waggon moved on four wheels of cast-iron, or of wood with iron rims, having an edge standing up on the rim of each wheel, in order to guide and keep them upon the wooden rails. The waggon is in shape of an inverted prismoid, having a door or false bottom hung with hinges and fastened by a hasp, that can be let go to let out the coals when the waggon has arrived on the staith, and over the spout which is to convey the coals into the ships or keels, or into a heap below as a store; obliquely over one of the hind wheels a strong crooked lever of wood is fixed and suspended, by a strap when not in action; this lever, called a convoy, is intended to act as a brake, by being let down upon the wheel when the waggon is descending down an inclined-plane, or steep part of the rail-way called a run; and on these occasions the horse is unharnessed from the front of the waggon and tied behind, and the waggon-man mounts astride on the hinder end of the convoy, the fore-end being confined closely in a staple in the side of a waggon; and, by means of a rest that there is for his feet at the tail of the waggon, he applies just so much of his weight upon the convoy as will either stop the waggon or give it the proper velocity in every part of its descent down the hill or run: see the *Agricultural Magazine*, vol. iii. p. 241. In the year 1783, we remember seeing an inclined plane or waggon-way as above described, on which the coal waggons descended down the hill from Wibley-slack to the town of Bradford, which is on a branch of the *Leeds and Liverpool* canal, their velocity being regulated by convoys as above. But some waggons which we have seen, had the convoy fixed to a moveable joint at the front of the waggon, and had a large block of wood thereon, which, when the convoy was let down, wedged in between the fore and hind wheels, and acted most securely as a brake for stopping or regulating the velocity of descent. The empty waggons were drawn up the hill again to the coal-pits by a horse.

An inclined plane for waggons, was erected some years ago by Mr. Barnes, a coal viewer at Bywell, near the Tyne river, of which a description is given in the *Agricultural Magazine*, vol. iii. p. 367, as follows: "It is a very ingenious, yet simple combination of machinery, for the purpose of regulating the conveyance of waggons laden with coals down an inclined plane, and for bringing the empty ones back again, by the same power that resisted its impetus in the descent. The length of the rail-way in which the wag-

gons run is about 364 yards, which distance it descends in two minutes and an half, and re-ascends in the same space of time; so that the loaded waggon can be let down with ease and safety, the coal discharged and the empty waggon returned to the pit within the compass of seven minutes. The impelling and resisting power of motion are derived from a plummet of $16\frac{1}{2}$ cwt., which the waggon in descending and ascending alternately raises and lowers to the depth of 144 yards. The rope, by which the waggon is impelled and accelerated, winds round the axis of a large wheel in a nich or groove in the middle, which gives the rope only space to coil round upon itself, and thereby guards against all possibility of entanglement. Near to the axis of the large coiling-wheel, there is an oblique indention (a range of teeth or cogs) of cast-iron, which corresponds with and works into a similar conformation on the rim of a smaller wheel; round which the plummet-rope is coiled or warped, and it is in consequence thereof moved round, only once in six rotations of the suspending and retracting wheel, which is the same proportion that the elevation of the plummet weight bears to the descent of the waggon; to preserve the rope from injury by dragging on the ground, rollers with iron pivots and brais sockets for it to run upon, are elevated in the middle of the rail-way, but sufficiently low to prove no obstruction to the waggons which pass over them." On shorter inclined planes than the above, horse-gins are sometimes used, for drawing loaded waggons up, and at the same time letting empty waggons down the planes.

The *constructing of Rail-ways*, or, as they are often called, tram, dram, or waggon-roads, require the application of principles so exactly similar, and they are so intimately blended with our several navigable canal and river establishments, that we have before mentioned our idea of the impropriety and difficulty of separating them by deferring the account thereof to a future place in our work: the subject of inclined planes, of which we have last been treating, has required the mention of so much relating to *rail-ways*, that we beg to proceed with and finish that part of our subject, before we resume the subject of bridges, towing-paths, fences, drains, boats, moving boats, &c. which yet remain to be mentioned. From the first opening of the coal-mines on the banks of the *Tyne* river above Newcastle, until about the year 1680, it appears, that the coals were conveyed in carts and wains, from the mouths of the several pits, to the keels or vessels, that conveyed them to the sides of the ships lying below the bridge. As this kind of fuel came to be substituted for wood in London and other cities, and towns on the south and eastern parts of the island, the consumption of Newcastle coals became so considerable, that we are told, that several coal-mines, as the Kinton, Benwell, Jesmond, &c. gave employment to 400 or 500 carts or other carriages each, for conveying the produce of those pits to the water-side: the difficulty and expence of maintaining so many horses, and cost of repairing roads for such considerable traffic, occasioned the introduction, about the period above mentioned, of waggon-roads or wooden rail-ways, on which waggons of a large size, with wheels of a particular form to suit the rails, were used, and which one horse could draw, owing to the regular and easy descent with which the rails were laid. It was not until the year 1738 that this important improvement was introduced at the White-haven collieries on the western coast, and it is truly surprising to observe how slow the introduction of them was in other parts.

Way-leaves or slips of ground were set out and hired on leases, or purchased by the different coal-owners of the several proprietors of lands, lying between their pits and the river, and this, not by the nearest route, but in such a direc-

tion as gave the most easy and regular descent. The inequalities of this slip of ground were levelled as a road, hollows were filled up, and sudden hills lowered, when sleepers or large logs of wood were laid across the same, their tops being all of a regular height; upon these, two rails, generally of beech wood, were laid parallel to each other, their ends abutting close to each other, and were firmly pegged down to the sleepers. The tops of the rails were planed smooth and round; the wheels of the waggons were low and of cast iron, or of solid wood with iron rims, which were not flat on the edge, but hollow to receive and move on the wooden rails; the inside edge of each wheel projecting near two inches, in order to confine the wheels effectually to the rails, and prevent the waggon from being drawn off the road. From all considerable works, there was a main way made for the passage of loaded coal-waggons as above; and another, or bye-way by its side, for the return of the empty waggons. When coal-mines had been worked into deeper ground, and pits or shafts were opened below Tyne-bridge, the rail-ways therefrom were conducted to the top of a stage or wooden building called a staith, on the wharf or key where the ships lay; and the coal-waggons, a description of which we have already given, were either emptied at once through the spouts into the hold of the ship, or deposited in the warehouse below in store for future ships. One indifferent horse could in general draw three tons of coals from the pits to the river side upon these wooden rail-ways; which mode of conveyance became further improved by the introduction of plates of wrought iron nailed on to the rails for the waggon-wheels to run upon. Attempts were made in different parts, to introduce cast-iron instead of wooden rails; but owing to the brittleness of the material, and the great weight of the waggons in use, they did not in general succeed.

About the year 1768, Mr. *Richard Lovell Edgeworth* contrived a remedy for the principal objection to cast iron rail-roads, in making use of two or three smaller waggons linked together, instead of one large one; a model of three of these he presented to the *Society of Arts* in the Adelphi, London, and was honoured by the premium of their gold medal. In the year 1788, the same gentleman, on some temporary wooden rail-ways for manuring of land, made several experiments, in the presence of different Mechanics, on the application of friction-rollers for diminishing the friction of waggon axles. The rail-ways hitherto constructed were private property, or for the accommodation of particular mines or works, and it was not, we believe, until about the year 1794, that Mr. *Samuel Homfray*, and others, obtained an act of parliament for constructing an iron dram-road, tram-road, or rail-way, between *Cardiff* and *Merthyr Tydvil* in South Wales, that should be free for any persons to use, with drams or trams of the specified construction, on paying certain tonnage or rates per mile to the proprietors. Soon after the year 1797, iron rail-ways began to be constructed as branches to the canals of Shropshire; and, in other parts of England, Mr. *Benjamin Outram*, an engineer, began to construct the same upon improved principles, of which Dr. *Anderson* has given an account in his *Recreations*, vol. iv. pages 199 and 473.

On the 25th of June 1799, the house of commons made a standing order for extending to all bills for making any ways or roads, commonly called rail-ways, or dram-roads, all the orders (of May 7, 1794) relating to the introduction of canal bills. One principal difficulty, the provision of water, does not here occur, unless for docks or basons, which are not unfrequently necessary, at the termination of a rail-way, at a river, or existing canal; and, as the owners of streams of water are not under dread of losing the same by the passage of

of a rail-way near them, and the same is applicable so much more easily to the uses of the owners and occupiers, than a canal is, less difficulties will attend the obtaining of general powers for making side or collateral branches, at any future period; and of connecting the same with different rivers, canals, or rail-ways, making the parties a compensation in tolls or otherwise, if such connection shall appear to draw off or lessen the trade upon any part of their line of communication, as often happens; and such ought always to be carefully investigated, and liberally estimated by the engineer, and the company be advised to act accordingly.

In surveying a line of country for a *rail-way*, principles somewhat different from those which apply to a canal, are to be kept in view; in the latter case, exact or dead levels are traced out, and the case of towing or dragging boats thereon is nearly the same in going one way as in returning the other, whether laden or not, for the ascent or descent of the locks or planes are there overcome by a different power than that applied to towing upon the levels; in a rail-way the case is different, the horse which in going one way draws a very heavy load down a slight descent, has to return again with the empty waggons, or a lighter laden, up the same ascent. It will therefore be necessary, as a preliminary step to setting out a rail-way, to calculate as accurately as possible the quantity of lading which will at the first or any future period be to pass each way upon the line, or on any particular parts of it, because on this will depend, in a great measure, the slope that it ought to have, and consequently the ground which the rail-way line ought to occupy. If it should appear, on an accurate calculation, that the same weight of lading may be expected to pass one way as the other, or that the same will preponderate at some periods one way, and at others the other way, the rail-way must in this case be set out in levels or very nearly so, and the unavoidable ascents and descents must be made by inclined planes, as before mentioned; on which either a greater number of horses must be stationed to draw waggons up, and in letting down, their wheels must some of them be slipped; or loaded descending waggons must draw up the others; the descent of a weight or tub full of water in a shaft must draw up a waggon, or more than one; or, a steam-engine, horse-gin, or walking-wheel, must be used as a moving power, with fly or brake regulators of the motion, as we have before mentioned. If the trade will always preponderate one way, as it generally will in the descent from mines to navigations, and the ground will admit of the same, the regular inclination of the rail-way ought to be such, that a horse can draw the usual lading down with the same ease as it can return with the waggons when emptied, or with a partial lading, in case of there being a small ascending trade. If the slope of the ground shall be found greater than to suit the above calculation, the rail-way ought to be set out for as great lengths together as is practicable, with the proper slope, and then to set out an inclined plane, as before mentioned. It ought to be well considered, where a rail-way or a branch from the same appears likely to have a descending trade at present, whether, at a future period, by extending the same forwards to any town or manufactory, or by other change of circumstances, the ascending trade is likely to be materially increased, in proportion to the descending; because in such case, the line would require to be altered in its slope, and moved to a new place, or it must continue to be worked to a considerable disadvantage by the horses having to travel down the line unemployed, to fetch up a portion of the loaded waggons. It will readily be perceived, that the adoption of the *best line*, of which the

circumstances of the trade and nature of the ground is susceptible, is a task requiring a degree of skill and patient research, not at all inferior to any thing required in the setting out of a canal, and it can hardly be necessary to point out the necessity of employing the most competent engineer, and allowing him proper time and assistance, in order to get the most eligible line marked out. A rough section of the different routes which appear eligible for a rail-way made by levelling with a spirit level, will be very useful in the first instance; from which, and a view of the ground, the engineer will be able to determine nearly the place and extent of the inclined planes, or steeper parts of the rail-way which will be necessary; these last being always made as short as the nature of the ground and circumstances will admit. These being settled, the line of the intended rail-way must be traced on the ground, beginning at the highest point, and stretching a chain on the ground, one end being held at the point of departure, the other must be turned round upon the face of the descent, until a point marked by this end is found, which is one link (or something more or less, according as the slope is to be) lower than the upper end; the chain being now moved forwards, till the hinder end rests on the point last determined, the other end is to be moved, accompanied by the levelling target, until a new point is found, one link lower than the last, and so on; by which, a line having the regular descent of one link in a chain, will be traced out on the ground, until the place of an intended inclined plane is reached. The stakes which are put in to mark the place of each successive stake will, as in the case formerly mentioned, of setting out a level for a canal, be found very crooked in many places; and it will be necessary for the engineer to stake out a new line, after a most careful view and consideration of the ground, as the approximate line for the centre of the rail-way; which must be without any sudden bends, that would occasion friction of the wheels against the sides or ribs of the rails. Single rail-ways will generally require about four yards wide, and double ones about six yards wide (exclusive of the necessary space for drains and fences), and this width will require to be levelled like a road or plane: it will therefore be proper so to set out the line, that the quantity of stuff which is to be lowered in one place shall always, with the least distance of throwing or barrowing, make up other places which are too low. Where sudden valleys are to be crossed, it will be necessary to conduct the line, so as to cut into the hill at each side of it, to find the stuff as readily as possible for forming the embankment: it will also be necessary to search carefully for gravel or stones fit for making the road between and under the rails; and if such can be got in the line, it may be a considerable saving of labour and of damage to the land, as well as a source of future advantage to the concern, to cut pretty deeply into such materials, as we have before suggested and explained on the setting out of a canal; which the reader, who wishes to understand this subject, would do well to consult. A line of stakes, exactly at a chain (100 links) apart, should be put into the line last staked out, and drove successively into the ground, beginning with the highest, so that the head of each may be very exactly one link (that being the fall we have assumed) below the level of the last; of course these will either stand above the ground, or be drove in the bottom of a hole, according as the ground wants raising or sinking, and will enable the engineer, on a review of the line, to judge more correctly, or to calculate where necessary, whether the line is set out in the right place to be formed at the least expence of labour, and with the least damage to the land; and when this is

found to be the case, the necessary width of land can be determined on, and the same surveyed and described by the surveyor, for the purposes of depositing the necessary plans with the clerk of the peace and with parliament. The different regular slopes or parts of the rail-way being determined in this manner, the steeper slopes or planes that may be necessary to join them, must next be set out and determined, by taking the whole fall or difference of the levels of the two ends, and dividing the same by the number of chains that the plane is to be long, for obtaining the fall which is to be allowed between each pair of stakes, instead of a link as before assumed. In setting out a single rail-way, it will be necessary, at proper intervals, to allow the width of land proper for a double rail-way, for a short space, in order to form passing-places for the waggons that are coming different ways. As part of the rail-way will in most cases be conducted along the side of a hill, or on side-lying ground, it will be necessary to consider the same in calculating to dispose of the stuff, and for the necessary ditches and drains for intercepting the springs and surface water in every instance, so that the ground of the rail-way may at all times remain dry. The draining, fencing, and bridges, will require to be done on the principles which we shall further on explain respecting canals; and the embankments, culverts, or tunnels, which may be necessary for preserving the proper slope in all places, are also to be done on similar principles to those of canals before treated of. It may be proper here to mention, that Mr. Robert Fulton, in his *Treatise* before quoted, pages 82, &c. has suggested and described different kinds of cast iron bridges for passing rail-ways over valleys, either level across, down one slope, and up the other of the valley, or rising obliquely up; in the first and last of which he proposes to avoid any solid platform or top for carrying the horse path, and to tow or drag the waggons over this open rail-way, by an endless rope or chain, passing over a pulley at each end, which can be set in motion by a windlass, a descending weight, or other power. On the approach to a river or yard, where considerable quantities of coals or other minerals are to be discharged, it will be proper to keep the rail-way upon a high level, by embankment, or on arches, or on a stage of timber, that the waggons may be discharged from the top of a staith or stage into ships or boats, or into carts and waggons, without being moved by manual labour. Rivers, brooks, or hollow roads, must be crossed on bridges whose tops are formed to the regular slope of the plane; and where roads cross the intended rail-way, they must either be raised so as to be carried over, or sunk so as to pass under the same; or be made up to the same height; and the rails must, in that part, have ribs of less height and greater strength, and the whole must be so firmly embedded on masonry, that the heaviest carriages, in crossing, cannot damage it: an instance of which may be seen in Wandsworth town street, and at several other places on the *Surry iron rail-way*.

A considerable facility is occasioned in the *constructing of Rail-ways*, after the plan of the whole is settled, the act passed, the land purchased, the work set out, and the ground levelled and properly settled, by being able to begin in any part where stone, gravel, and other materials that are wanted are to be most conveniently had, and to work from those places without the heavy expence of common cartage, except for the iron rails or blocks of stone for sleepers, if such are not found upon the line.

We will therefore suppose the work to begin at some point where the line intersects a rubble rock or a bed of good gravel, and the surface of the road is to be covered therewith

for about a foot thick, and the same is to be nicely levelled, and any great or rough and out sized stones should be carefully picked or raked off, that the whole may the sooner settle down and become one compact mass; these large stones may be thrown forward upon the unformed part of the road, to be covered with smaller and better gravel. This covering of rubble or gravel must be nicely raked and levelled and beat or rammed down, to make it as compact and solid as possible. A great quantity of blocks of hard and durable stone must be got in readiness, from 8 to 12 inches thick, and weighing 150 to 200 lb. each; the shape of them is not very material, so that the bottom is flat, to bed firmly and evenly on the gravel, and the top is to be chiselled to a level to receive the ends of the iron rails; in the centre of this flat part a hole must be drilled about $1\frac{1}{2}$ inch diameter, and 6 inches deep. Two flat and straight gauges of iron must be provided with pins riveted into their ends to suit the holes in the stones; the pins on these gauges should be at the exact distance on one of them to suit the length of the iron, generally three feet, and the other to suit the distance of the rails apart or breadth of the road, usually about 4 feet. One of the stones being laid in the proper place for the beginning of one side of the rail-way, and nicely bedded and rammed down upon the gravel, another stone is to be laid at 4 feet distance for the other side of the road, and for bringing them to the exact distance and level, the pins of the breadth-gauge are to be entered into the holes in each stone, and a common or mason's level is to be applied to the top of the gauge; if the stone last laid is found too high or too low, it must be lifted up again, and gravel must be raked out, or more fine and good gravel sprinkled in and rammed down, until the right height is obtained; the stone is then to be laid on again, and brought to its proper place by means of the gauge and level; care is to be taken that the top of the stone is level, so that the flat ends of the gauge bed exactly and evenly on the stone all around the hole; and if this is not the case the chisel must be used to take down any irregularity and produce this bedding of the gauge bar. A third stone is then to be laid on one side and the length-gauge pins entered into the holes, by which the exact and proper distance of the stones will be ascertained, and for trying the truth of this stone as to height, a level is to be used, in which a line is very carefully drawn by the engineer, making the exact angle with the perpendicular line that the rail-way is to make with the horizon; this being applied upon the length-gauge will shew whether the stone last laid requires more gravel under it, or any to be taken out, observing always to level the gravel carefully and to ram it down, and also to ram the stone down upon the gravel, before each ultimate trial of its proper position as to level, its distance measured by the gauge from the other stone, and its range by a line stretched in direction of the intended rail-way. With these precautions the stones are to be successively laid, and gravel of the best quality, and without any large stones, is to be laid in, to fill up the spaces between them; and some on the outside of the stones, the better to secure them in their places; and when a certain length is done, as no mortar or other soft material is used which requires time to dry or set, the work is ready to receive the rails, and will be then immediately fit for use, to carry forward the gravel, stones, and other materials for the work as it proceeds. We have before mentioned that the ground work should be settled; and for this purpose the levelling of the road should be performed early in the winter, and the rains and frost will effectually settle it, by the time the work gets dry enough in the ensuing spring; before

before which, the work should be carefully gone over again, to level and fill up any parts which have settled more than was expected and allowed for.

The *cast Iron Rails*, in the earlier use of them, as on the extension of the Caldon branch of the *Trent and Mersey* canal, to Mr. Gilbert's lime-works, 4 miles in length, (which was in use long before 1794,) were fastened down upon longitudinal rails of wood, which lay across several wooden sleepers, embedded in the gravel, as we have described above; these rails were three feet long, and had two holes, at 18 inches apart, to receive the wooden pins which fastened them down, or rather confined them in their places, on the wooden rails: (see *fig. 31, Canals, plate iv.*) at one end there was a triangular projection, and at the other a similar notch which fitted into each other; a rib stood up along one side, to confine the waggon wheels to the track; and opposite the holes, the rail which was about $1\frac{3}{4}$ inch thick and weighed about 42 lb. was made wider to strengthen that part; yet, with this precaution, such rails were very liable to break in two at the pin holes, as well as to loose their connecting triangular piece; the rib also was very liable, by the wheels or other things striking against it, to get broken off near the ends, and the waggons were not confined from running off the road in such places. The rails of the *Surrey Rail-way* are represented in *figs. 32 and 33*, and are, we believe, of the most improved construction; they have their ends resting on separate blocks of stone embedded in the gravel as above described, and, instead of pin-holes through them, each rail has a similar rectangular notch in its end, which, when two of them are laid close together, forms a counter-work-hole for a square and headless spike of iron, that is to fasten the ends of both the rails. These rails consist of a rectangular plate of cast iron, 3 feet 2 inches long, 5 inches broad, and 1 inch thick; a piece of metal about half an inch thick is added in the casting, to increase the thickness at each end for 5 or 6 inches in length, where it is to bear on the stone and receive the spike; a rib is cast on to each edge of the rail, one of them above, and serves to guide and confine the waggon wheels; the other below for adding strength; these ribs which are about three-fourths of an inch thick form by their top the segment of a large circle, being about $3\frac{3}{4}$ inches high in the middle, and about $1\frac{1}{2}$ inch at the ends, by which these ribs are calculated to give the greatest strength to the rail in the middle, where it has no bearing, and to make them not to be easily snapped or broken off, as mentioned of those rails above, whose ribs are of an equal height throughout; small circular projections of metal are cast on to the width of the rail near each end, and the same are carefully bedded upon the stone, for preventing the rail from being overturned laterally, by the action of the wheels against the rib. For crossing of common roads, the rib, (see *fig. 34*.) is made only an inch high throughout, and near an inch thick, and its edges are well rounded off. In these situations, a few rows of pavement, of good square stones, such as the carriage way of the streets of London are now paved with, are kept nearly or quite as high as the ribs of the rails, by which the heaviest waggons, carts, and coaches pass over them almost without any sensible jolt. Crossing-rails are used at every passing-place, or point where waggons are to pass out of one track of rails into another, which are very numerous in the company's yard, by the side of their basin or dock for barges, in order that empty waggons or those loaded may be readily pushed into one of the tracks further off the wharf, to let other full or empty ones advance, on their proper track, to the sides of the barges. A B C D, *fig. 35*, represents one kind of crossing-rails, shewn

in connection with four common rails, parts of which are represented by E, F, G and H; a wedge or tongue of wrought iron, I, is moveable round a pin, and is represented in the figure, as placed against the stub K, so that the track from G to F is clear for one of the wheels of a waggon; and by moving the wedge I till it rests against the stub L, the track from H to E would be clear; before the waggon can pass in the directions above-mentioned, the wedge will often want moving by hand to the proper position, but in going in the opposite direction from E to H, or from F to G, the action of the wheel against the wedge will always move it into the right position; there is a circular guard or stub cast on to the rail behind the joint of the wedge for preventing the wheels from striking directly against the end of the wedge.

The method in which the rails are fastened to the blocks of stone on which they rest, is by an octagonal peg or trunnion of good sound dry oak, fitted to the hole in the stone, so as to drive easily into the same, otherwise its swelling by wet and the driving of the spike might split the stone, this plug of wood is not long enough to reach the bottom of the hole, and is sawed off even with the top of the hole; a hole is then bored through this plug of wood, and an iron spike with a flat point, and a head just fitted to the counter-sunk notch in the ends of two rails, when applied endways together, is drove; by which the rails are sufficiently confined, and yet in case of any wear or settling of the stone, so that the rail gets a little loose, it is capable of moving that small space without breaking out the sides of the pin-hole in the rails. It will be proper, always to drill a small hole from the bottom of the plug-hole, quite through the stone, for the rain water to soak away into the gravel, otherwise the freezing of water in the holes would often burst the stones. Care must be taken from time to time, to keep the tread or surface of the rails clear of dirt or stones, which last would stop the waggon, and perhaps break the rails; and too much pains can hardly be taken by raking and sorting the gravel, for the finish or top of the road, and rolling or ramming of it down, to settle the same into a compact and hard road as soon as possible, having no loose stones, which the horses are always kicking on to the rails, and while this is the case, the man who attends the waggons should always go before his horse, and look carefully to the rails, and remove any stones that may have got upon them. The waggons in most general use on the *Surrey iron Rail-way* weigh, including their loading, about $3\frac{1}{4}$ tons, the wheels are two feet five inches high, of cast iron, with 12 spokes, which get wider as they approach the hub, which is eight inches long to receive a small wrought iron axle; the felloes or rims of the wheels are two inches broad, and nearly as much thick, and the sharp angles are rounded off, so that these wheels are capable of being used without damage on any hard common road; a very principal advantage attending the modern use of rail-ways. The axles of the wheels are fixed at two feet seven inches distance; the bodies of these waggons are seven feet nine inches long, four feet five inches wide, and two feet four inches high; these are used for bringing down chalk from the Surrey hills to make lime, carrying back manures, &c. The foundries, and others upon the line, have trucks or waggons of different kinds to suit the nature of their goods; the only apparent limitations being in the width of the wheels and carriage, the length of their axles, and weight of loading.

For the more ready emptying or shooting the contents of the waggons into barges lying in the dock, a strong stage is erected on the wall, which projects over the water, and in

order to turn waggons short round and back them on to this stage, the rail-way passes over a large circular plate of cast iron, which is suspended on a pin beneath its centre; there being a circular ring under its circumference, which moves round freely, with a considerable number of small wheels or rollers, whose axles are fixed therein, (see figs. 45 and 47, *Plate VII.*) upon another circular iron plate firmly fixed below; by this arrangement, it happens, that as soon as the fore and hind wheels of the waggon are advanced on to this circular plate, a very small force applied to the waggon will turn it a quarter round, along with the plate and rails on which it rests: the waggon is then run backwards off the plate, on the stage before mentioned, and its contents are shot into the barge below; it is then returned upon the plate, and the same is turned round until the rails thereon match the track, and the waggon can then move forwards, to make way for another loaded waggon, to be emptied in like manner, or it can be shoved backwards to a crossing-place, as may be required. A ton weight or more in a waggon can easily be shoved along by a man, as he does a wheel-barrow. Rail-way branches are capable of being conducted into every foundry, or other great work near the line, to terminate under their large cranes for hoisting goods, so that heavy articles can be loaded at once on to trucks for the rail-way. The branches of a rail-way admit of being multiplied almost without limit; farmers and others who have but an occasional trade, may have their own waggons to be kept locked, and left for them by the side of the rail-way, one or more at a time, from the gang that is passing along the line. About November 1800, Dr. *Anderson* recommended, in his *Recreations*, vol. iv. p. 204, the adoption of a double rail-way for heavy carriages between London and Bath; and about March 1802, Mr. *R. L. Edgeworth* recommended, in *Nicholson's Journal*, 8vo. vol. i. p. 221, the experiment to be tried, on one of the great roads, for ten miles or more out of London, of a rail-way with four tracks, one for slow and another for fast travelling carriages going each way, in order to avoid meeting or delay; these he proposes to adapt to chaises and stage coaches, by means of low cradles or platforms, with wheels adapted to the rails, on to which a chaise, coach, or other carriage, could be drawn, and there confined, in order to be drawn along the rail-way; and which cradles the coaches might leave at any desired point, to be drawn on the common road, which he proposes to have by the side of his rail-ways. Dr. *Anderson*, in the volume above quoted, recommends rail-ways to be made from the docks in the Isle of Dogs, to different points in the environs of London; and he proposes the bodies of these rail-way waggons to be moveable, and to be hoisted off by cranes with their lading in them, and he placed on other, and larger wheels, with shafts adapted to the streets; which, after delivering their lading, would return, perhaps laden with other goods, to the cranes to be replaced on the rail-way wheels. In vol. v. p. 291, of the doctor's work, it is recommended to use waggons on the proposed rail-way with wheels large enough, and of a proper construction, to be used in the street also. Wherever any considerable work is to be done, as in the excavation of the *London-Docks*, it has been found to answer, to lay down temporary rail-ways; and such as admit of being moved as parts of the works become complete. For the use of mines, this facility of removal is often of consequence, as the veins or pits wear out.

Doctor *Anderson* observes, that 20 tons, in a barge upon a canal, will be drawn with ease by one horse, travelling at the usual rate that waggons move; and that on a rail-way the same horse would, under favourable circumstances, trans-

port the same quantity of goods in a given time; but Mr. *Fulton* says, that five tons to a horse is the average work on rail-ways, descending at the rate of three miles per hour; or one ton, upwards, with the same speed. Mr. *Telford* observes, that on a rail-way well constructed, and laid with a declivity of 55 feet in a mile, one horse will readily take down waggons containing 12 to 15 tons, and bring back the same waggons with four tons in them. Mr. *Joseph Wilkes* in 1799 stated, that a horse of the value of 20l. drew down the declivity of an iron road $\frac{1}{10}$ of an inch at a yard, 21 carriages or waggons, laden with coals and timber, weighing 35 tons, overcoming the *vis inertia* repeatedly with ease. The same horse, up this declivity, drew five tons with ease. On another part of the road, where the declivity was $1\frac{1}{2}$ of an inch at a yard, the same horse drew down three tons; but it was necessary to slipper or lock the wheels here, to prevent his being overpowered by the descending weight. On a different rail-way, one horse, value 30l. drew 21 waggons of 5 cwt. each, which, with their loading of coals, amounted to 43 tons 8 cwt. down the declivity of $\frac{1}{3}$ of an inch in a yard; and up the same place, he afterwards drew seven tons; the cwt. in all these experiments of Mr. *W.'s* being 120lb. In the summer of 1805 a trial was made on the *Surry* rail-way by Mr. *Banks*, wherein a horse, taken indiscriminately out of a team, drew 16 waggons, weighing upwards of 55 tons, for more than six miles along a level or very slightly declining part of the rail-way.

Dr. *Anderson* has calculated the expence of carrying goods in common waggons, or turnpike roads, a distance of eight miles, at 3s. 4d. per ton, and of carriage, the same distance, on a rail-way, at 4d. per ton, or only a tenth part of the former. *Recreations* iv. 208.

For steep descents, sledges, or slippers of iron, must be provided, similar to those in common use with road-waggons, which can be placed under the wheels of the rail-way waggons, and hooked to the side of the waggon by a short chain, in order to cause the wheel or wheels to slide upon the rails, whereby the tendency to descend may be checked.

Mr. *William Chapman* has, in his *Observations*, p. 42 and 54, recommended the use of waggons, that are to run on to the rail-ways that are to be prepared in the bottom of a flat-bottomed boat, instead of unloading the contents of the waggons into the boat; and when this boat with its waggons has arrived at its destination, the waggons are to be run out upon other rail-ways, to proceed forwards by land if necessary.

Mr. *Carr*, we are told, has introduced in the mines of Shropshire, and other places, a slight kind of iron rail-ways, called train-roads, for the use of very small waggons in their under-ground works.

Mr. *R. L. Edgeworth* has suggested (*Nicholson's Journ.* 8vo. i. 223,) the use of light circulating chains running upon rollers, which are to be put in motion by small steam engines placed at considerable distances; to these chains he proposes carriages to be attached, for dragging them along upon rail-ways instead of using horses. Since steam-engines have been brought into use, to work by the expansive force of steam, and requiring no water for condensation, a successful trial of applying them to moving the trams on a tram-road has been made, viz. in February 1804, on the *Cardiff and Merthyr* rail-way, where 10 tons of iron (long weight) loaded on tram-waggons, with the additional weight of about 70 persons for great part of the way, were drawn for nine miles upon the tram-road, at the rate of near five miles per hour, by the use of one of these steam-engines fixed on its own waggon made by Mr. *Homfray*, (for which engines Mr. *Trevethick* had previously taken out a patent, though it

is perhaps an old invention) no supply of water for the boiler being found necessary in this distance.

The cost of a single rail-way, with crossing-places, for a descending trade, was estimated by Mr. *Fulton*, who wrote in 1795, at about 1600l. per mile. Mr. *Wilkes*, in 1799, stated, that the expence of completing a mile of single rail-way, where materials of all descriptions lay convenient, and where the land lies tolerably favourable for the descent, would be about 900l. or 1000l. fenced, &c. exclusive of bridges, culverts, or any extra expence in deep cutting or high embankments. Dr. *Anderson* mentions, in 1800, the sum of 1000l. per mile as the probable cost of a double rail-way in the most favourable situations, and of very stout ones in the vicinity of London, where labour is dear, not less than 3000l. per mile; and Mr. *Wilkes* says, that wherever the quantity of goods to be conveyed on a rail-way, having a descent of not more than $\frac{1}{2}$ an inch in a yard, amounts to two-thirds of downwards, and one-third of upwards loading; it is a doubt, if it will not, in that case, be a cheaper conveyance than by a canal, besides the rail-way being more certain, where dispatch is necessary, on account of frost and dry seasons. Another advantage attending rail-ways is, the greater certainty of the estimates for the same, when made with care and judgment, and the facility with which the whole work may, in general, be contracted for, to be completed at a stated time. The principal rail-ways which have been executed, are the *Cardiff and Merthyr*, the *Caermarthenshire*, the *Sirhoway*, the *Surrey*, and the *Swansey and Oystermouth*; and such branches will be found to the *Asby de la Zouch*, *Cromford*, *Derby*, *Ercwasb*, *Lancaster*, *Leeds and Liverpool*, *Peak Forest*, *Shropshire*, *Somerset Coal*, *Trent and Mersey*, and several others, to which number almost every day is adding.

The *constructing of Bridges* for crossing canals and navigable rivers, often occasion a very serious part of their whole expence, and this circumstance occasioned the attempt in some of the earlier canals, to substitute paved *fords* in many instances; Mr. *James Brindley* proposed these at first, for some places on the *Trent and Mersey* canal; and on the canal which Mr. *Davis Dukart* constructed to the *Tyrone* collieries in Ireland, these were substituted in place of bridges. Mr. *Fulton* has recommended the general adoption of fords on his small canals, but Mr. *Chapman* observes, that the water in such cases must not exceed two feet nine inches in depth, as otherwise hay, sheaves of corn, &c. in common carts would be liable to get wet in crossing. On the China canals we read, that there are elliptical arches of stone over their canals, the longer axis being vertical, and high enough for the masts of their vessels; these bridges being only intended for foot passengers, and are ascended and descended by steps. On our canals, bridges for foot passengers only are generally constructed of wood, and are mounted by steps, as at *Paddington* on the *Grand Junction*. In all large and important bridges the arches should undoubtedly be so formed that the materials thereof are in equilibrium, independent of the cement that may be used between the stones or bricks; the principles of which arches will be found in our articles *ARCH* and *BRIDGE*; but for the common bridges for crossing of canals, which are wanted in such great numbers, flat semi-elliptical arches have been, in general, adopted, on account of such giving width for the canal and towing-path underneath, without raising the top any unnecessary height, which so enhances the expence of landing up, or forming the slopes to the bridge. From the habits which necessity has in a great measure introduced with canal bridge-makers, of using only the best materials, performing the work with great care, and not striking their centres too soon, such bridges are found to stand tolerably well, although very far removed

from an equilibration figure; yet instances are not wanting on most canals of their settling, and even falling down in some cases. A kind of brick bridges have long since come into almost general use on canals, of which we have given a plan, section, and perspective view. See *CANALS*, *Plate IV.* figs. 40, 41, and 42. The form of these bridges is well calculated for saving of materials, and giving strength at the same time, the whole of the walls being more or less battering, and the side walls are splaying outwards at their ends, to make the entrance on to the bridge the more easy, by which the side walls are rendered curving inwards in every part. In the building of bridges the utmost care must be taken to sink the foundations down to sound stuff, or to drive piles on which to begin the work; it is a good practice to have wedge like or arching bricks made, on purpose to use after a certain number of courses of key bricks, or those forming the soffits of the arch, and to introduce oblique courses of bricks for the more effectual tying of the work together, as we have mentioned in speaking of tunnels. Large bricks made of the best earth and well burnt, should also be used, placed on edge upon the top of the walls of the bridges, as a coping, unless very good stone is near at hand, the top corners of the coping bricks or stones should be carefully rounded off in the making, in order that the same may present as few angles as possible for the weather or the traffic to catch hold of.

We have before mentioned the care which ought to be taken in every instance, to find stuff with the least possible expence of moving it, for landing up the bridges; from these having, in some instances, been left too steep for the convenient and safe use of the public; it has not been uncommon, in later acts, to make provisions on these subjects; on the *Grand Western* it is enacted, that the ascents to the bridges shall not exceed $2\frac{1}{2}$ inches in a yard, and on the *Wilts and Berks* this rise is limited to 3 inches in the yard at the most. The width of the carriage-way, on the bridge, in the narrowest places, is also fixed in some acts, wherein we have seen 12 feet mentioned as a limit in some cases. We have before observed, that the canal ought, if practicable, to be conducted into deepish cutting, wherever a brick or stone bridge is to be erected, in order that the stuff may be thereby procured, for landing up each side of the bridge, and that the abutments of the bridge may be the more solid, and the foundations more likely to reach sound stuff, without an extra depth of walling, or the necessity of piling for such purpose. On this account it is, that the tail of a lock generally presents a proper place for a bridge, and where the walling, which must have been made for wing-walls, below the lower lock-gates, is avoided, or turned to account in the bridge. In places, where from the great traffic that is to be expected, or other cause, a towing-path will be wanted on both sides of the canal, the bridges should be made on a scale large enough to admit of a towing-path on both sides under the bridge, as in the two or three bridges nearest to *Paddington* basin, on the *Grand Junction*.

For *occupation*, or accommodation bridges, and even on some public roads, as on the *Sankey* canal, and others, a kind of swing or swivel bridge has in general been adopted, of which some mention has been made under our article *BRIDGE*. See fig. 43 *Canals*, *Plate VII.* A flat platform of wood strongly framed together, covered with planks, and having side rails, is prepared, wide enough for the purposes of a bridge, and about half as long again as the canal is wide, in the contracted walled part intended for the swing bridge. One end of the platform for this bridge is framed as light as can be consistent with strength, and the other very heavy, with provision for stowing large stones

stones or pigs of cast iron therein, so that the same will rest in equilibrio on a point at about one-fifth of its length from the heavy end; under this point, a large circular plate or ring of cast iron is fixed, having a smooth circular hollow sunk therein. An exactly similar plate is embedded, and firmly fixed on the solid wall at the side of the canal, except that this last has a strong iron centre or point standing up, to enter a hole sunk in the upper plate to receive it. On this pin the bridge is suspended in equilibrio, and in order that no impediment may arise to turning the bridge round, when its balance is by any circumstance destroyed, a number of smooth cast iron balls, of two and a half or three inches diameter, are placed in the circular groove or hollow ring in the two plates, which act effectually as rollers for lessening the friction between the circular plates, in turning the bridge on and off the canal; or, a ring containing several rollers (*figs. 45 and 47*), is substituted instead of the iron balls above-mentioned, between the lower and upper plates *figs. 44 and 46*. A recess is formed on the bank just to receive the bridge, when a boat is to pass, and when the bridge is turned across the canal, each end of the bridge (which ends are rounded into circular arcs, struck from the centre pin), slides on to a similar circular recess in the road, with a firm bearing at a very small distance below the ends of the bridge, when it is in equilibrium, on the centre pin and balls or rollers; by this arrangement it happens, that the heaviest loaded carriage, crossing the bridge, is not able to depress either end of the bridge on which it passes, in any sensible degree. The engineer should carefully avoid the use of these swing, or indeed of any moveable bridge, where the towing-path is to change from one side of the canal to the other, because the bridge must remain across the canal until a barge in passing, is got near enough for the towing-horse to cross over the bridge, and the bridge must then be turned off the canal before the boat can pass, and it continually happens, unless the towing-line is of great length, or is cast off at some distance before the boat arrives at the bridge, or the greatest dexterity is used, that the boat strikes the bridge before it can be turned off the canal into its recess: where several boats are closely following each other, these difficulties are much increased, and great delay must take place, or the bridge will soon be knocked to pieces. Swivel or turn bridges have sometimes been erected on the towing-path side, but they form there a most serious obstacle to the towing of boats; and on that account are generally placed on the off bank, and as no methods have hitherto been brought into general use, of turning on or shutting such bridges for persons to pass over them, except the persons, or some others, are at the time, on the same bank of the canal on which the bridge stands, in order to turn it over the canal; this has occasioned the necessity of clauses in every act, or set of bye-laws, requiring boat-men always to shut to every swing-bridge, or draw-bridge, as soon as their boat has passed. The great loss of time and labour in thus continually turning the bridges on and off, the wear that such continual use occasions, and the frequent damage which such bridges sustain from boats striking against them, if, by the least delay of the boat-men or accident, they are not turned off before the boat gets up; have occasioned our thinking a good deal on the subject, in hopes of devising some method of turning the bridge on when wanted, from either side of the canal; because such a contrivance would authorise the alteration of the present regulations, and require each swing-bridge to be left open, and out of the way of the navigation, except during the time that it was actually in use, by persons or carriages passing over it: another material evil would thereby also be remedied, that is, the difficulty which now exists of prevent-

ing the farmers' cattle, in the fields on the off side of the canal, from passing over the bridges, and escaping along the towing-path, without an expensive circle of fencing and a gate to separate the bridges from the fields, for no gate or obstacle can conveniently be made on the towing-path side to obstruct their passage. Chains and pulleys under the canal, and motion conveyed upon *Bramah's* patent principle, in pipes under the same, were considered among others, as the means of turning the bridge on, when wanted; but, our speculations hereon were, happily, at the moment of writing this (October 1805,) interrupted by the information of a method, which was successfully brought into practice very lately, by Mr. *Benjamin Bevan*, the engineer upon the middle district of the *Grand Junction* canal, viz. near the steam-engine on the Wendover branch, where a swing-bridge of the common construction, with a railing or fence on each side of it, has an addition made to it, on the side that is next the canal when the bridge is open, or in its recess, at about three-fourths of its length, from the centre pin on which the whole turns; this consists of a jib like that of a crane, or the bars that are sometimes used for stopping carriages at the ends of streets: an upright piece of wood is hung by two hooks and thimbles, like those of a common gate, to the standard or upright on the side of the bridge; to the top of this a rail of 4 or 5 feet long is fixed horizontally, supported by a brace underneath, from near the bottom of the upright piece; on the top of the horizontal piece are two strong staples fixed, adapted to receive the thickest end of a very slender and light pole, such as are used for the handles of hay-rakes, but they must be longer, and rather larger for wide canals; a nail drove in between the staples through the pole fixes the same, and makes it form a light and easily renewable continuation of the top rail quite across the canal, so that a person, wanting to cross the bridge from the towing-path, can take hold of the end of the pole and pull by the same, and thereby turn the bridge over the canal; or, if a person has crossed the bridge towards the towing-path, he can with equal facility take hold of the end of the pole and shove the bridge round to the other side. The hinges of the jib that carry the pole are so adapted, that the pole has a tendency to hang directly across the canal, to the most convenient point for being taken hold of; but, at the same time it is with the least force turned round on its hinges until it is brought along-side of the bridge, and quite out of the way of boats that are passing. This very simple and cheap apparatus, we are told, answers effectually; no impediment is offered to the horse or towing-line; but when a boat arrives, whatever part thereof strikes against the pole, it recedes and suffers the boat to pass, and then by its own weight resumes its situation across the canal, ready for turning the bridge. The solid part of the jib is not made long enough to be liable to be struck by the boat, or a man standing thereon; and poles in plenty, of the proper size and length, can be in readiness, for replacing in a minute any pole which is worn out or broken by accident.

Bridges which have no towing path under them, present a great obstacle to towing, because the line must in those cases be cast off from the barge; except, occupation bridges, like the wooden one at Rotterdam in Holland, could be introduced, where the bridge, we are told, consists of two separate segments, each supported firmly on its own bank, and leaving a slit quite across the bridge for the towing-mast to pass through, and thus they avoid casting off of the line: this slit need not be so wide but that foot passengers can with ease and safety step across it; and, on the passage of horses or carriages, a moveable flap turning quite flat back upon hinges, might be turned over to complete the road.

Where

Where swivel bridges of great width and strength are required, and need but seldom to be turned off, as for admitting ships at high water to the *West India* and *London Docks*, double wooden or cast iron swivel bridges are in use, with a moveable frame under each part, constituting parts of the ribs of the bridge, which frames turn on a hinge or joint, and are taken up or suspended by a screw at the other end, to clear the walls of the bridge when the same is to be turned off; and which, when the bridges are turned over to meet in the middle, can be let down by turning a winch, so as to fall in strong grooves prepared in the copings of the walls, and complete the abutments of the ribs of the bridge, as strongly almost as a fixed wooden or iron bridge could be made; an excellent example of which may be seen in Wapping street, crossing the entrance to the *London Docks*, as mentioned under the article *BRIDGE*. It appears that Mr. H. Shadwell was rewarded for some improvements to swivel-bridges which he suggested to the *Society of Arts*. See their *Transactions*, vol. xiii. page 227.

Draw-Bridges are not uncommon as accommodation bridges on some canals; the frame or platform of them, with their side rails attached, is moveable on strong hinges upon the top of the wall or one side of the canal, and when down shuts into a groove prepared on the opposite wall, so as to present no projection or obstacle to the road over it. For raising these bridges, two strong and tall posts are fixed upright on the bank of the canal a little behind the hinges of the bridge; on the top of these posts are two very long and tapering pieces of timber called balance-beams, which turn on a hinge near their middle, their small ends being connected by chains to the further end of the bridge, to which the thick ends of the balance-beams are made to be a counterpoise, by means of lead or iron nailed on to the same if necessary: when the bridge is shut, or prepared for passing over, the balance-beams rest nearly horizontal, there being a chain attached to the thick end of each, which hang down and can be reached by a man or boy, and by pulling at which, he can rear the bridge up upon its hinges for boats or vessels to pass. For crossing the Docks in Liverpool in different places, very large draw-bridges are in use, supposed to be the largest in England. But we are informed by Mr. Rennie, an engineer of the first eminence, that he has seen much larger draw-bridges in France. On the *Forth and Clyde* canal the draw-bridges are double, meeting in the middle of the canal when shut down. It appears that the Chinese have a sort of draw, or rather sliding bridges over the piers of the flood-gates of their canals, which, to prevent interruption to the masts of vessels, are constructed so as to be easily withdrawn when vessels are about to pass; they are flat wooden bridges, narrow and light, resting on rollers fixed in their frame, and running on a couple of loose spars that are withdrawn after the bridge. Wooden bridges are very often wanted for carrying the towing-path over the entrances to docks, or the side branches of a canal, and from their great span, to avoid a narrow place at the turning; these are often attended with considerable expence; they should be constructed of very sound and durable timber, well trussed, and as light as is consistent with strength, as they are seldom made wide enough to be used except by men and horses. We cannot too often advise that bridges of wood or iron, and stone ones also of large span, should be wider at the abutments, and diminish by a proper curvature of the sides to the middle, to prevent the strain of the materials on a sudden lateral impulse, from causing them to give way and cripple sideways.

The ingenuity and enterprise of British artists have given

rise within the last 30 years to an improvement of the first importance to river navigation, by the introduction of *cast iron bridges* of great span and height, by the adoption of which, in favourable situations, ships may be admitted further up into our large rivers; and in almost every case, the impediments to navigation may be removed that are occasioned by the narrowness and lowness of the arches of our old stone bridges, which not only exclude or interrupt the towing-path and necessitate barges to lower their masts, but in general cause such a fall in the water, owing to the deficiency of their water-way, as to be dangerous and impassable at particular states of the river. Near Coalbrook-dale on the *Severn* river this improvement was first carried into effect, as particularly described in our article *BRIDGE*. A perfect model of this bridge, which is 100½ feet span and 45 high within the arch, was prepared by Mr. Abraham Darby, who cast the same, and presented to the *Society of Arts*, in whose collection it may be seen by any one who applies in the Adelphi: see their *Transactions*, vol. vi. pages 228 and 232. Buildwas bridge of iron over the *Severn*, within two miles of the former, we have already described in the article referred to, and have only to add, that Mr. Thomas Telford, the engineer of this bridge, has given a plate of the same in *Plymley's Agricultural Report of Shropshire*, page 316. For the principles on which the Wearmouth bridge, which we have described, is formed, Mr. Rowland Burdon on the 18th September 1795 took out a patent, which see in the *Repository*, vol. v. page 361, where a view of this very curious structure will also be found. We are sorry to add that we heard lately in conversation, that this bridge has shewn symptoms of twisting or giving way sideways, which have greatly alarmed some persons for its safety. The cast iron bridges at Bridgewater on the *Parret* river, and at Staines on the *Thames*, have been mentioned in our article referred to above; the latter, owing to the mistaken economy of the trustees, in having vaults made in the abutments, which ought to have been of solid masonry, gave way, and has been entirely taken down, as the new stone bridge erected before it, was obliged to be from the same cause. We cannot enough admire the prudent precautions of the select committee of the House of Commons in 1800, who investigated the different proposals for rebuilding of London bridges. (See *Tilloch's Philosophical Mag.* vol. x. page 13.) They consulted the opinions of the most eminent professional men, and had a very accurate set of models, constructed in brass by Mr. Berge, the successor to the celebrated *Ramsden*, under the direction of Mr. Atwood, for illustrating the nature and properties of equilibrium arches. One of the designs which were presented to this committee, and which has since been engraved by Mr. Wilson Lowry and published, is that of Messrs. Telford and Douglas, for a single arch of cast iron of 600 feet span, and rising 65 feet above high-water mark: as this scheme has not yet, nor ever may be carried into execution, it would be swelling the present article too much to detail the excellent provisions which the contrivers had made, for the execution and stability of this grand work. We proceed, therefore, to mention, that Mr. Fulton, in his treatise so often before quoted, has given designs (plates 14, 15, and 16), and explained the principles, page 120, of different bridges of cast iron. On the 24th May 1796, Mr. James Jordan took out a patent for constructing bridges which should be suspended from ribs of iron above: see *Repository*, vol. vi. page 220, and on the 7th February 1797, Mr. John Nash obtained a patent for a method of constructing bridges of hollow quoins of iron, that can be filled with masonry or other solid matters after the bridge is put together; the piers of bridges he proposes in like manner to construct

struct of hollow cales of iron, to be filled with masonry after they are brought to their proper places: see *Repertory*, vol. vi. page 361. Of wooden bridges for large and navigable rivers, we have given an example in the once justly famous Schaffhausen bridge over the *Rhine*, in our article *BRIDGE*. Mr. *Fulton* mentions a very famous one at *Wettingen* in Switzerland; and has given us designs for bridges for newly settled and woody countries, wherein large timbers dowelled together, supply the place of key-stone, above which the platform for the road is to be supported. The same gentleman has proposed in constructing the above kind, or iron bridges that are very flat and low, to obtain the necessary stability of the buttments, by continuing the line of key-timbers or ribs with their proper curvature for some distance into the bank on each side. We have before spoken, under the article *BRIDGE*, of the proper form of the projecting angles of the piers of a bridge, and shewn that for navigable rivers, sharp corners should be avoided, from the damage that such might do to the boats and vessels.

Bridges will be wanted in the construction of rail-ways for carrying the rail-road over rivers, sudden valleys or roads; some of these may require cast-iron arches; some of them must be of stone or brick; but oftener, such may with propriety be constructed of wood, taking care that they are effectually trussed, or formed on the best principles, also that the joints are effectually secured from wet, and the whole covered with a coating of mineral tar or paint, to be renewed from time to time to keep out the weather. One other thing remains to be mentioned respecting bridges, i.e. owing to the contraction of the canal and curvature of the towing-path at a bridge, the towing lines are apt to fret and wear away the corners of the bridges, occasioning also a great waste in ropes: for remedying this, light hollow cylinders of wood are placed upright, or nearly so, according as the wall is upright or battering, at all the corners of the bridges or other obstructions to the direct line of the towing-path; these cylinders being hung on centres or pivots, at top and bottom, they turn round by the action of the rope, and prevent friction and wear.

The *Towing-Path*, horse-path, or hauling-way of a canal, should always be on the lower side if practicable, the traffic on the same having a tendency to consolidate the new made bank, to prevent the accumulation of weeds and the harbour of vermine, that by lodging in and perforating the bank might endanger the same. The towing-path should change as little as possible from one side of the canal to the other, and when this is unavoidable, it should be always done at some fixed bridge, to avoid the inconveniencies before pointed out; the change ought never to be made in deep-cutting, as has been done near *Tring* on the *Grand Junction*. The towing-path ought never to be interrupted if the same can be avoided; and, besides having a way under all bridges (except those where a change of sides is to be made) we hope to see the example followed, which has been set at *Atcham* on the *Shrewsbury*, and *Newbold* on the *Oxford* canals, of continuing the towing-path through the tunnels, wherever the same shall appear practicable. On the proposed *Bude* and *Launceston* canal, it was intended to form a towing-path on both sides; a hint that may prove very useful in some situations of greater traffic, than there ever was likely to be on this canal. It is often provided in the act, that the towing-path may be used by the owners and occupiers of land on the line as a bridle-way, or as a drift-way for their cattle; as on the *Asby de la Zouch*, *Grantham*, *Leicestershire* and *Northamptonshire Union*, *Oakham*, &c. Frequently, permission is given to persons to use the towing-path as a foot-path or bridle road, and we think it would in some

instances be proper to obtain the power of levying a small toll on horse passengers; if the company should at any future time see it right by public notice to permit their towing-path to be so used. It seems inapplicable to the purpose of a towing-path, to make public drift-ways of them in any case, on account of the damage which loose cattle would do to the banks and fences, and the impediments which droves of cattle would present to the hauling-horses and lines. In forming the towing-path, care must be taken to make the ground sound, and to cover it with a proper thickness of good gravel; and we cannot but recommend the raking or sorting of this as it is laid on, throwing the large or irregular stones forward to be covered with better gravel, so that the surface may be smooth and even, without rough and large stones to throw the horses down, and render the use of the path unpleasant. On the duke of *Bridgewater's* canal, where proper materials for road-making are very scarce, the shale and slates, or refuse coals from the mines are brought out and calcined, or burnt in very large heaps, the cinders of which are used for making and repairing the towing-paths upon his canal. The height of the towing-path ought not to be less than one foot, or more than two or three feet above the surface of the water, or top-water line.

The *fencing* of the sides of a canal is a business deserving of more attention than has been usually paid to the same. Quick-set or other live fences ought by all means to be made, except in the case of a rocky country, where good and durable walls can be built at an easy expence: rail or pale fences are very improper, except in and near towns, on account of their heavy expence in repairs. The continual weeding which quick-fences require, the great injury which the plants sustain from weeds, if the same are at any time suffered to grow up, and the damage which the pulling or hoeing up of weeds so repeatedly, do, in wearing away the soil, and more or less exposing the roots of the quicks, and besides these, the plants being often wounded in their tender bark by the hoes used by the weeders, are most serious difficulties in the raising of quick-fences, wherever our experience has extended, except in the north-eastern parts of *Norfolk*, where the spirited and intelligent tenants, that there abound, have a method of raising fences, which they are continually doing during the currency of their leases, that we are happy, in this instance, of being able to mention, because it has not yet, we believe, appeared in print. The line of an intended hedge and ditch being marked out, the first step is to collect carefully all the top-soil or vegetable mould into a ridge where the centre of the bank is to be, and if this vegetable mould proves too abundant, the extra quantity is thrown into heaps further off, in order to be mixed with dung, or carted to some parts of the land, which wants a greater staple of mould. This done, a row of spits or lumps of earth out of the ditch are laid carefully in the front of the bank, and on these, when reduced to a regular line by paring with the spade, the white-thorn sets are placed a little inclining upwards, at about four or six inches apart; care is taken in laying in the sets, that their roots are bedded in the vegetable mould, that is to form the centre of the bank; when this is done, another row of spits or lumps is dug out of the bottom of the ditch, and laid upon the quicks, which being patted down and levelled at top with the spade as before; another row of quick-sets is laid in, taking care that each plant in the upper row is over a space in the lower one, and that their roots are inclosed in the top-soil. Other fods are then dug out of the ditch and piled up, with the proper slope or batter, until the bank is raised to the intended height; the vegetable mould is then dressed up into a regular bank at the back, and the remainder of the

stuff from the ditch is thrown over, and is afterwards carefully spread and laid up against the back of the bank, so as entirely to enclose the vegetable soil in a case of dead earth, or stuff taken from below, where cultivation has deposited the seeds, or nature the viviparous roots of such plants. Still further to accomplish this exclusion of the soil in the bank, from the action of the sun, air, and other stimulants to vegetation, at a proper season in the spring, a quantity of dead earth is pared up from the bottom of the ditch, and worked and chopped about, until it is in the state of *puddle*, before described. The tops of the quicks are cut off nearly even with the ground, after which, a labourer carefully plasters every part of the face of the bank with this prepared or puddle-like stuff; and after it is laid on, having a pail-full of water at hand, to wet his spade in if necessary, he works this plaster about, giving the flat surface of his spade exactly the circular and plastering motions that plasterers use when at work on a ceiling or wall. If it should appear that frosts have mouldered down, or injured the facing of the bank, the same is carefully repaired and worked again, as above, before the season for the vegetation of the quicks. As soon as the white-thorns have put forth their leaves in the spring, a careful labourer walks along the ditch, with a knife in his hand, and wherever a plant is missing, from among those which have shot forth, he digs in the point of his knife with care, to find and release the top of the set, which otherwise might be smothered and confined by the plastering of the bank. The benefit of this procedure is inconceivably great, in almost totally preventing the growth of weeds, and in confining the moisture in the vegetable mould from escaping in dry seasons. At a time in the summer, when every part of the surface was covered with vegetation, we have with pleasure examined some miles in length of quicks treated in this manner, and although the quicks had made the finest shoots which could be imagined, not a vestige of vegetation of any kind besides was to be found on the bank; and thus, with proper care in renewing the plastering or working of the bank, many of them remain until the quick is grown up to be a fence; and it is almost literally true, that weeding is here unnecessary, although no soil can be more congenial to, or worse stored with the seeds of annual weeds, than some of those were of which we have been speaking. The ditches are made deep, and the sides of them as steep as the soil will stand in the general, so that dead or guard fences are generally omitted on that side; and so they are often on the other, or back side, and a prick-hedge is substituted, which, with care, and the letting of sheep only loose in such fields, answers the purpose very well. Some time before the bank is made up to the intended height, the labourer goes along upon the top of it, shovels off the loose top, and treads down the top of the bank so as to form a flat of perhaps 12 or 14 inches wide; into the centre of this he strikes in his spade, and gives the same a lunging motion, so as to open a narrow and deep notch; this operation he repeats, until a notch of this sort is opened the whole length of the bank; he then proceeds to stick this with short and rough bushes, so close as to make a complete hedge; he then throws up out of the ditch as much stuff against the bushes as will lay on the plane or top, in which the hedge is struck, and beats the same down strongly with his spade; the same process is followed at the back of the hedge, by which these bushes are so securely set into the bank, that they will often stand until the quick is become a fence; in places where the destructive pilfering of the poor is properly repressed. Some may perhaps consider us as going here too far into the subject of fencing, but we request of such to consider how important the subject is to a canal-

company, which may have to raise much more than a hundred miles in length of quick-fences, as was the case a few years ago with the *Grand Junction* canal company, and some others, some of whom are still feeling the very heavy burden of weeding their quicks two, three, or four times annually; which an adoption of the above principles would, we are certain, have tended to reduce most materially. See our articles *ENCLOSING, FENCING, &c.*

The quick for a canal ought to be placed a little above the level of the towing-path, and be separated therefrom by a small ditch, to prevent the towing-horses from biting or trampling on the quick; but the principal ditch, where the sudden falling away of the off-bank does not answer the same purpose, ought invariably to be on the field side, for keeping the farmers' cattle at a proper distance from the quick, and to check their attempts at jumping through or over it. The quick ought not to be placed too near the towing-path, and the hedges should be carefully cut and plashed about every twelfth year, both to preserve them vigorous and in good growth, and also to preserve the towing-path clear. On the *Oxford* canal, near Braunston, we remember that the hedges were so grown over the towing-path, in the year 1799, that it was quite dangerous riding along, and the horses were driven so near the edge of the canal, by the intrusion of the bushes on the path, that the bank was suffering materially. In places where the canal is embanked, it will be proper to place the hedge at the bottom of the slope, in order to enable the company the better to prevent the growth of rank and large weeds, and the consequent harbouring of vermin, which would lodge in the bank: steep embankments might also be materially damaged by the treading of cattle on their sides. Through common fields, or very large pastures, it is sometimes not necessary to fence off the towing-path therefrom, but at the boundaries or entry to such fields, a gate is placed in the towing-path, to prevent the intermixture or escape of the cattle; and generally these gates are double, falling rather forcibly towards each other, by which construction the cattle are prevented from pushing, or the wind from blowing open the gates, as would otherwise often happen.

At the termination of every principal estate or farm that adjoins the towing-path, it is usual to place a swing gate across the same, to prevent cattle getting away, in case they should break, or by accident get into the towing-path. Cylinders should be placed, as before described, against each of these gates for the towing-line to run upon; and side rails should be placed inclining up to the top of the posts, to assist the rope in getting over the same.

Draining is another expensive business, of which a canal company will have a good deal to perform, in most cases. Soon after a canal is filled with water, and often sooner on the upper side, owing to the course of the land-springs, and those of a more permanent character being intercepted by the puddle-ditches, wet places will appear on the land, which would, if neglected, become unfit for cultivation; these are often of considerable extent below the canal; and the committee of the canal company must not be surprized at hearing the farmers attribute many wet places in such situations, to the soakage of their canal, that really are not affected thereby. It would be of use, and the source of much satisfaction, if the resident engineer were to note down in his book all the wet and springy places that appeared on the sloping land, below the level of the canal for a considerable distance, and the condition or run of water from each before the canal was made; because the appearance of new queaches, as the farmers in many parts call them, or the increase or enlargement of others, is often the first and only indication of

an increasing and hurtful leak from the canal. The committee should not be nice in drawing the line, as to the extent of draining which they order to be done; but it would, on the contrary, be highly to the credit of their concern, and the interest of future canal schemes, to bear the whole or a portion of the expence of effectually draining all the land, whose wetness could, even in mistaken prejudice, be ascribed to their canal. The execution of these operations ought not to be confined to the quackery of boring a hole here and there in a trench, without any theory or meaning; but the resident engineer, or some professional man employed expressly for the purpose, should, by a judicious application of his experience and knowledge of the *strata* in every place, apply that particular method of draining, as to the situation and depth of the drains, &c. which every spot may require. And these operations are more various and important than what any person, who has not made the subject his particular study, can possibly be aware of. See our article DRAINING. There is a danger attending drains made near a canal, from rats or moles working their way unobserved beneath the surface, between the drain and the canal; for detecting which, or other leaks, it will be proper for the resident engineer to enter in his book a minute description of the situation of the mouth or vent of every drain, choosing situations for the same, when they are made, in ditches, where they can be readily got at, and not be liable to be damaged by time, or the treading of cattle. The length and direction of every branch of under-drain which vents at that mouth, should be noted down, and the quantity of water which the drain discharges should also be carefully estimated, at some short distance of time after the same is finished; and a regular and periodical inspection of these drain-mouths by the engineer with his book in his hand should be made, by which any secret leak could hardly fail of being detected. It is almost unnecessary to point out the importance of an attention to these circumstances, in situations where water is very scarce.

The construction of Boats for canals and rivers requires some notice in this place. Mr. Chapman, who has given some excellent directions respecting the form of boats least liable to overfet or be injured by heeling, has very properly observed (*Observations*, p. 102.), that the area of a cross section, of a boat to be used on a canal, ought not to approach so near to the area of a cross section of the water in the canal as 1 to 3, or considerable inconvenience will arise, both from the increased resistance of the boat, and the damage to the banks, from the counter current to fill up the space the boat leaves in her rear. This circumstance requires particular attention, particularly in boats that are to move quick, like the passage-boats from Manchester and Paddington, on *Bridgewater's* and the *Grand Junction* canals: in the former of these, we observed a constant elevation of the water before the passage boat, as it moved along, of at least 9 inches, and perhaps more than a foot at times; and the rapidity with which the water ran backwards, between the boat and the sides of the canal, appeared to have a most destructive effect upon the latter, particularly on the towing-path side; and often this was laid quite under water, for considerable distances together, by the surge or wave opposite to the head of the boat as it passed along: while the labour of towing was most materially increased. We regret that we had not the means of ascertaining, how much the head of the boat was elevated upon this artificial wave in the general, and up which inclination the towing mules were constantly drawing it. Some attention ought to be paid to the form of the head and forepart of the boat, with a view to its letting the water pass freely off by its side: flat headed

boats, and those whose ends are rectangular in particular, ought not to be towed fast, or great loss of labour and damage to the banks will be the consequence, unless the canal is very wide and deep. It has been proposed to form boats sharp at one end and flat at the other, so that the flat ends being joined, two of them may form a body, diminishing properly at each end, for easy passage through the water, and for steering. Mr. *Nicholas King*, an American, has proposed boats in four parts, that can be detached when the same are to pass an inclined plane, and be afterwards rejoined. Since the use of cast-iron has become so general, Mr. *John Wilkinson* has constructed boats and barges of iron, some of which are used on the *Severn* river, and others upon the different canals in Staffordshire, Worcestershire, &c. Mr. *Robert Fulton*, in his *Treatise*, p. 31, has proposed and described a kind of rectangular boxes, with low wheels (or rather trucks, as the axle and them are to be cast in one piece) fixed under their bottoms, to be used upon canals instead of boats, on account of the use which he proposes to make of them, upon inclined planes and rail-ways, as well as on the water, as we have before mentioned. Mr. *William Chapman*, who has examined this system particularly, in his *Observations*, has proposed and given drawings of wheeled-boats of a different construction, larger wheels let into the bottom of the boat being used; and his boats are so contrived, that several of them, linked together by their ends, can be used together either upon a canal, or a rail-way, or plane. The same author has recommended and described a kind of flat-bottomed boat, with a single or double rail-way on its floor, which he proposes to receive or discharge a loading of rail-way waggons, as it lies in a shallow dock, from which the water has been drawn, and to which it is to be again admitted when the boat is to float out into the canal. For ease in getting loaded waggons in and out of these boats, a pair of leaves, or water-tight flaps, are contrived to let down, and permit the junction of the fixed rail-way on the land and the part thereof that is on the floor of the boat. A curious method of steering boats is in use on the *Bedford, Ouse*, the *Cam*, and others of our eastern rivers: two boats are always used together, one of them having a strong pole, or bowsprit, projecting horizontally from above its prow; this is brought over the stern of the boat which is to go before it, and the prow or stem of one boat is fastened by a rope close to the stern-post of the other; to the first boat the towing-line is fixed, and the bowsprit of the last boat is used as a tiller to set or retain the last boat to any required angle with the first, by which the last boat acts very effectually as a rudder for steering the first. Mr. *Chapman* proposes to adopt this principle with small boats upon canals. The west-country bargemen, on the *Thames*, guide or stop their boats, as they are floating down the stream by a long and strong pole; with iron prongs at bottom and a cross handle at top, round which they dexterously wrap a short rope, fastened to the side of the barge, when the pole has struck into the bottom of the river.

For speedily emptying the cargoes of small boats into larger vessels, Mr. *Davis Dukart* contrived, on the navigation to the *Dungannon* Collieries, to float his small boats on to cradles or wheeled carriages, on which they were dragged up a short inclined plane, and upon a rail-way conducted over the barges in the basin; and then the boats could be turned over, and their contents shot at once into the barge. A different method, as Mr. *Chapman* informs us, is practised in South Wales: it consists in continuing the canal (which may be a wooden trough) to the place of discharge, and terminating it on a caisson, suspended on a transverse centre; the boat being arrived at its place, the end of the canal is closed

closed by a stop-gate, and the small quantity of water contained in the caisson (which the boat should as nearly as may be fill) being let out, the caisson with the boat in it may be turned over, as already described.

The moving of Boats upon canals or narrow rivers, where sailing is impracticable, has always appeared attended with considerable difficulties. Where the width and depth of water will admit, long oars have been used, worked by one or two men on each side of the vessel, as is done on the coal-barges and lighters on the *Thames* in or near London. On the *Tyne* river at Newcastle, their keels are said to have been in use ever since 1378, and are rowed by an immense oar on one side, another being used at the stern to steer by, and counteract the tendency of this strange mode of rowing. It is said that the large oar is hung by an iron ring, so as to admit of its being laid on the gunwale of the keel, when not in use, but not of its being removed. Owing to the want of any regular and proper path on which horses could travel by the sides of rivers, the first hauling or towing of boats was performed by men, as still continues to be the case on the canals of China; and in this country most of our navigable rivers were without horse towing-paths till of late years. Within our recollection, ten or fifteen men were seen tugging at the hauling-line of a barge on the *Thames*, in the meadows of Twickenham. A good horse-path now begins at Putney bridge, on the south side, and continues uninterruptedly on one side or other of the river to the extreme points of the navigation. These essential appendages to navigation are but now completing on the *Severn* river, which has been so long famous for its navigation. The towing-path on many of our old navigations is continually interrupted and broken off, by mills and other obstacles, without any bridges for the crossing of the towing-horses and boys. On the *Ouse* river, below Bedford, we have observed the towing-path to be interrupted at the end of almost every field, by high and dangerous stiles, over which the ill-fated navigation-horses have to leap, encumbered by their harness and the heavy rope. No regular path is maintained, in a great part of the distance, by the owner of the navigation; but frequently the fine meadows there are cut up, by the track of the horses being at a considerable distance from the river, across the many bends that it has; and the farmer's grass, between this path and the river, is rendered of little value, by the soiling and dragging of the hauling-rope over it; the banks of the river are also miserably worn away, by hauling so far from, and consequently so obliquely to, the direction of the stream. In many places, where the river is wide, there is no track for hauling, except along the bed of the river itself; where often the horses, with a wretched boy upon one of them, are seen sometimes wading, and at others swimming, along the course of the river! Nothing is more common than seeing the horses and boy have to swim over from one side of the river to the other, when the hauling-way changes; not unfrequently this is impracticable, from the total want of a way on either side, and the poor horses are obliged to leap from the bank, perhaps when at a considerable height and distance, into the head-room of the barge, to the great peril of their bones and neck: shortly after, these wretched animals, and probably with a boy on their backs, are forced to jump out again, and perhaps plunge into the deep river and swim on shore, to resume their labour of towing. A correspondent of Dr. Anderson has expatiated (*Recreations*, v. 318.) on the barbarous sight of six horses harnessed at length, towing a barge up the *Thames* above Putney, by a single line of insufficient length, by which the hind horses were in continual danger, in spite of their utmost exertions, of being precipitated into the river: what would this humane gentleman have

said, if his walk had been along the banks of the *Ouse*, on a piercing winter's day? It is owing, in a great measure, to the enormous difficulties and expence of constructing and maintaining a proper horse-path by their side, that the navigation of many of our rivers is so imperfect. In all flat countries, except the river is embanked, as in Cambridgeshire, Lincolnshire, &c. and without any wide wash or fore-ground within the banks, the towing-path often cannot be made up above the reach of the floods, but, during every flood season, will be under water and useless; and perhaps, when the water subsides, it will be found carried away by the force of the current for great lengths together. On some of our canals, the practice at first prevailed of towing by men; and the same still continues on the *Stroudwater* canal, whose towing-path has stiles upon it, like those of a foot-path, at the divisions of different persons' lands. Horses are now, in general, used for towing boats on our canals, except the late duke of *Bridgewater's*, who reared a large and fine herd of mules, that were found to answer so well, that none others are used to this day, we believe, on that canal. Except with passage-boats, and flies or packet-boats, for the expeditions conveyance of packages and parcels, the usual rate of tracking or towing upon our canals is about $2\frac{1}{2}$ miles per hour, including the time lost in passing the locks, which, if of 8 feet rise, will require about $5\frac{1}{2}$ minutes each.

It is certain that there is hardly any limit to the load, which one horse can move, in a number of barges attached together, when going with a proportionally slow pace; and this has occasioned some canal advocates to assert that one horse will, on a canal, draw as much as 60 on the road; while Mr. Robert Marshall has asserted, that horses will not be able to move more than 15 miles per day with deep laden barges on a level canal. On most of the wide canals it is usual to employ a horse to each barge, or to a pair of boats of half the width each that the barges are. It appears, that on the *Ketley* canal, on *Bridgewater's* canal between Worsley and Manchester, and others, several of the small boats in use thereon are linked together, and drawn by one horse or mule; there being projecting and smooth rails provided on the *Ketley*, at all the convex points of the bank, to keep the boats in their proper track. Mr. Fulton has imagined, that 15 or 20 of his small rectangular boats, linked together, could be drawn by one horse, and be kept in their proper line upon the canal by a man with a boot-hook walking by the side of them on the towing-path. Besides the methods of rowing and tracking, which we have been mentioning, on the *Tyne*, the *Thames*, and most of our rivers, hitches, sets, puyes or poles, are used for shoving of barges along: the gunwale of the keels or barges is made wide and convenient to walk upon, and the boatman, being at the head of the barge, sets his hitcher against the bottom and shoves against it, walking along the gunwale of the barge until he has arrived at the stern; when he draws up his hitcher quickly, and returns to the head to repeat the same operation, and this sometimes on one side of the barge and sometimes on the other, unless there are two men so employed, whose equal action could keep the barge in its direct course. This last method might be more used than it is upon canals; but from the necessity which most of them have found, for prohibitory clauses in their act, against the use of any pointed poles, particularly such as are shod or tipped with iron, on account of the damage which such often do, by penetrating and disturbing the lining and banks of the canal, and causing it to leak. We have heard of an attempt lately, to introduce a kind of hitcher-iron on the *Grand Junction* Canal, which should present a flat end or surface, sufficient to prevent its penetrating the facing on the bottom or sides of the canal, and having a small turn up at

the point, which might remedy the loud complaints of the boatmen, at being debarred a hooked pole on board their boat, by which a comrade, who has the misfortune to fall overboard or into a lock, might be dragged up to the surface of the water. We have thought that it might be worth while, particularly in crooked and difficult parts of a canal for hauling, and where rubble stone or gravel is in plenty, when a wide canal is cutting, to form the covering of the lining, or the facing of the bottom, and perhaps of the lower part of the sides also, of gravel or rubble instead of earth, and carefully to level and ram or roll the same down like a road, so that hitches might be used freely thereon as on the bottom of a river. There would still, however, require very strict and well enforced regulations, to prevent the walls of the bridges, locks, tunnels, &c. from being pecked and greatly damaged by the points of the hitches. Slide-rails will also be necessary, in and near the locks or tunnels, as we have mentioned in speaking of the Blisworth tunnel, which can, without damage to the walls, be removed, when decayed or worn out. Before we proceed to the subject, that has perhaps produced the greatest number of unpractised mechanical inventions that are any where else to be found, we mean for *moving boats* by an impulse from within or accompanying them, we have one other thing to mention, viz. that Mr. *James Jordan*, in his patent of the 24th of May 1796, for bridges, before quoted, has proposed the use of circulating chains across an aqueduct bridge, for towing boats over the same; and avoiding the expence of the extra width for, or lateral support of, a towing-path thereon.

The volumes of the *machines approved by the Academy at Paris*, and the *cabinet of M. de Servier*, printed in 1719, contain plates and descriptions of many different contrivances, designed for *propelling or rowing of boats* on canals and rivers; one kind of these, which we shall first notice, depends upon gaining an impulse or hold against the ground at the bottom of the river or canal; in one of which, a small boat moved by oars was proposed to be employed in successively carrying forwards and dropping anchors whose ropes were to be attached to a horse-gin on board of a barge, which was designed to tow or drag a great number of others. In another, a spiked wheel was proposed to roll on the bottom of the canal, attached by a frame moveable on hinges at the stern of a barge, where a roller turned by a winch, was to give motion to the spiked wheel and propel the barge, by means of an endless rope or chain. See also *Walker's Lectures*, 4to. page 350. A second kind depended upon the same principles as an oar, except in the construction and mode of applying the power. On the 20th of July 1796, Mr. *Thomas Polts* took out a patent, for the use of a large flap or oar, moving on an horizontal hinge, upon a framed lever at the stern of a barge, intended when the handle of this lever was lifted up by several men, to turn on its hinge and present but little resistance; but on the descent of the lever, its whole surface was by the action of the men at the lever, to be exerted on the water for propelling the barge: see *Repertory*, vol. vi. p. 160. In the year 1801, Mr. *Edward Steers* took out a patent, of which we have seen only a short extract in the *Monthly Magazine*, vol. ix. p. 486, from which we understand his invention to differ but little from the above, except in having two paddles or oars. Mr. *Robert Balfour* took out a patent, for applying the principle of luffer-boards or venetian-blinds to several purposes, which he has explained at length in his *Essay* printed in 1798; and at page 60, proposes to propel ships by large oars or fins of this kind to be hung on the sides thereof by hinges, and worked by a lever, as a rudder is by its tiller; poles with square frames fixed on their ends, to push against the water

behind the vessel are also described. A third kind, depending on the reverse of the action of an under-shot water-wheel, has had many advocates; the first that we have met with in our own country, is Mr. *Thomas Savery* in 1698, whose contrivances are shewn in *Harris's Lexicon Technicum*, art. Engine; it consisted of 6 or 8 paddles like those of a water-wheel on each side of the vessel, fixed on an axis across the same, on which was a trundle head, and under this a wheel working into the same, by the force of a capstan to be turned by men. We are told, that in the year 1781, the *abbé Arnauld* proposed to apply the power of a steam-engine on board of a vessel, for working paddles, something like the above, we believe. Soon after this period, we remember seeing on the shore of the *Thames* at Westminster, a small barge with a water-wheel in a cavity in its stern with a steam-engine for working it, which was said to be the contrivance of *earl Stanhope*, and had been tried with success against the tide in the river. In the year 1797, a vessel having rowers by its side, that made 18 strokes per minute, from the action of a steam engine on board, was tried on the *Sankey* canal near Liverpool, by which it was propelled 10 miles and back again to the same place: see *Monthly Magazine*, vol. iv. p. 75. In the same year, Mr. *Walker* (the lecturer) made some experiments on the *Thames* at Reading, and caused a boat to row itself against the stream. See his *Lectures*, 4to. page 349. About the year 1800, *Messrs. Hunter and Dickinson* took out a patent, for a propeller for ships, which was tried in January 1801, on board of a government sloop off Deptford on the *Thames*, and the sloop thereby made way against the tide at the rate of three knots an hour. *Monthly Magazine* vol. xi. p. 195. In the *Journals of the Royal Institution*, about the year 1802, there is a description of an improved application of the steam-engine, to the turning of a wheel for propelling boats; the cylinder of this engine is horizontal, and the wheel with paddles is in a cavity in the stern of the boat, which therefore has two rudders, one on each side of the wheel, connected together by cross rods. A vessel of this kind was constructed for the *Forth and Clyde* canal company, under the direction of Mr. *Symington* the inventor, and in a trial made in December 1801, it drew three vessels of 60 or 70 tons burthen each, at the rate of $2\frac{1}{2}$ miles per hour on their canal: see *Agricultural Magazine*, vol. vii. p. 152. We read in the last mentioned work, vol. ix. p. 218, that Mr. *Robert Fulton* exhibited a vessel on the *Seine* at Paris, in August 1803, having two wheels with paddles, worked by a steam-engine, and that two other vessels were towed by it against the stream at the rate of 3 miles per hour. A fourth kind of boat propellers, has depended on the rotary motion of a screw, or fliers like those of a snook-jack; Mr. *Daniel Buftnell*, in his attempts to navigate sub-marine vessels, as related in the *Transactions of the American Philosophical Society*, vol. iv. p. 303, used oars, placed near the sides and top of the vessel, formed upon the principle of a screw, the axes of which entered the vessel, and by turning the same one way, the vessel was made to advance or descend, as it was to recede or ascend by a contrary motion of the screw. Mr. *John Vidler* has contrived a vessel, which has been lying, and occasionally tried in the *Thames* at Westminster, for 2 or 3 years past, that has a boom hung by an universal joint (Hook's) at the stern thereof, to a rotative axis, turned by a capstan upon the deck of the vessel; at the end of this boom is fixed a circle of strong flyers, just like those of a snook-jack, which by striking the water obliquely as the boom is turned round, propel the vessel forwards; near to the flyers there is a collar on the boom that turns easily therein; to this collar ropes are attached,

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attached, which go to different parts of the stern of the vessel, and by which the boom, when in motion, can be drawn up quite out of the water, if its propelling action is wanted to cease on any temporary occasion, or the flies thereof can be let down into the water to any depth which may be required, or be turned aside from the direct line of the vessel to steer her on any course, without wasting so much of the propelling power upon the rudder as is usually done in steering; a rudder is however applied to the vessel ready for use when occasion may require. The fifth and last method, which we recollect to have seen or read of, consists in pumping water, by a force-pump through an orifice or pipe at the stern, or end of the keel of the vessel, with such force as to propel the vessel along, by the stroke of the moving column of water against the water, in which the vessel floats; we are sorry that our memory does not serve us to mention the name of the inventor of this method, or the work wherein we saw a description of the apparatus. In the *British Magazine*, vol. i. p. 397, it is mentioned, that in the year 1800, a vessel was constructed at Liverpool with a steam-engine in it, which was moved along without the intervention of any machinery; we think this as likely to have been, an application of the pumping principle above mentioned. Although, as we hinted above, none of the mechanic contrivances here mentioned have been adopted in practice, we trust our readers will not be displeased, at the short notice which we have given of each, with a view to preserve their memory, and in hopes that the thing may yet be accomplished.

On the *repairing of Canals* we think it necessary to say something; and to begin, by recommending the adoption of a system of management, by which the earliest notice of any defect, or want of reparation, will be obtained: that in store-houses, at proper places on the line, a stock of oak, elm, and deal timber should constantly be kept, cut out and seasoned, ready for replacing any of the timbers or planks in the locks or other works, with the least possible delay to the trade; a circumstance which, if not attended to, may prove of incalculable injury to the credit and success of the concern. Sound and good bricks, and stones, ready for replacing any which are liable, or observed to be likely to want repair, should also be in readiness, and good cement should always be kept in readiness, on some part of the line from whence the quantity wanted may be speedily transported to any part where a reparation of the walls, bridges, culverts, &c. may require the same: however, before emptying any part of the canal, or interrupting the trade for any reparation, a strict search should be made throughout every part in that level, or on the adjoining ones, to discover all the defects therein, that arrangements may be made beforehand for repairing the whole at once, or with as little delay as possible, while the trade is interrupted on the line. In every store-house a considerable number of the *pile-planks* before described should be kept piled up in readiness, for making temporary flanks or dams, in order to empty any particular part of a level, which may have a culvert, trunk, sluice, stop-gate, lock-sill, or other thing which is damaged, out of order, or decayed. It is surprising, to those who have not seen such works performed before, with what facility the workmen who are used to this business will drive two rows of pile-planks so regular and close to each other, that by the help of the tongues or slips in their grooves, and often without, a tight flank is made without any earth or other loose matters to stop the water; and between two of these flanks, if such are necessary, they will empty the water, by chain pumps, or water-wheels, to get at any culvert, or other matter, to be repaired or altered; there have been instances of these operations being performed, and of the part being filled with water, and the plank-piles

drawn up again for the trade to pass, in the space of eight or nine hours. Should any part of the canal appear to want new lining or puddling, owing to a neglect at the time of making of the canal, or to any subsequent accident, care should be taken to choose the time for such works, when the trade can best bear an interruption; and as, on the average of seasons, the trade is two or three weeks interrupted by ice, during the months of January and February, it may not be amiss to embrace that period, on some occasions, although the work may be longer about, and some additional expence may be incurred by covering up the work with earth, before it is left at night, to prevent its freezing, and in removing all such puddle, &c. again in the morning, or at beginning work, which shall be found frozen. Previous and explicit notices should be given of all intended interruptions to the trade, as long beforehand as is necessary, to enable the traders to supply stocks of articles at the places of consumption on the line, and to avoid having their barges locked in, and perhaps lying idle, when they might have been employed if they had been on a different part of the canal.

It is an essential point of good management to have experienced mole and rat-catchers employed from time to time upon the line of a canal, to extirpate these hurtful vermin; and in every instance of discovering one, to trace out all his burrows and holes, and have them carefully stopped up and filled in every part, as well for preventing the harbouring of other animals of the same sort, as for preventing the water from making its way into and through them. On a canal in Surry, we are told by Mr. Robert Marshall, in his *examination of a canal and rail-way*, &c. that a mole or rat hole only, occasioned, after the hard frost of 1795, the rupture of the canal in a high embankment, by which more than 100 yards in length of a lofty bank was precipitated into the meadows and river below, and that a barge which before lay enveloped in the ice on the canal, was hurried down through this gulph into the river! It is impossible to take too much care against such fatal disasters as these, and the duty of the mole and rat-catchers ought not to be limited to the company's ground, but in all fields, banks, ponds, or brooks within 100 yards or more of the canal, on each side, they ought to be equally attentive to the destruction of such vermin, and the demolishing of their secret retreats. The same men might very properly be employed in pulling up and extirpating all large and spreading weeds from every part of the banks of the canal, and in mowing down the herbage occasionally; these circumstances being not less essential for the neatness and beauty of the canal, than to prevent the first harbour of vermin of different kinds. The banks of the canal will be very apt to continual wear at the surface of the water, and for some height above and below that level, if a proper kind of herbage is not encouraged upon the slope of the bank: considerable care should be taken to suffer no plants to take root on or near a canal bank, or spread its seed, (if possible to prevent it where water is taken into the canal by a feeder), which will grow in deep water, or whose roots are large, hollow, and strike deep into the ground, lest the former of these should choke the canal in time by weed-beds, and the latter render it leaky by the formation of numerous open tubes through the lying into porous stuff. None but those who have seen many drains or new ditches opened in wet and boggy ground, can be aware of the depth, size, and number of hollow roots, which some of the aquatic plants, as the *equisetum palustre*, or marsh horse-tail, the *iris pseudacorus*, or yellow flag, and several others, send forth into the ground.

Puddle-ditches, in the banks that are raised or made up, are a great security against the bank being washed down,

in case of the water, risen by any sudden thunder-shower, or other inordinate rain, breaking over the top of it; as soon as the puddle is reached, the effect of the stream to tear and lower the bank will often be stopped; for good puddle, when properly set and hardened in the centre of a bank, is so compact as not to be liable to be abraded or suddenly worn by a current of water. In case of the breaking or slipping of a bank, so that a considerable and wide breach is formed, and still increasing, it is a good practice to drive in two rows of common fold hurdles, at a foot or less apart, lashing the same well together by cords, and securing them by strong stakes drove down behind them, and if the stream of water be deep through the breach, it will be necessary to drive other long stakes obliquely into the ground, and securing their tops to the hurdles and upright stakes by laps of cord, that these last may act as struts to prevent the whole being borne away; into the cavity between the hurdles; straw or stubble should then be put and trod down, beginning at each end and working towards the middle, in order to prevent the current being turned, with fresh impetuosity, against the sides of the breach; such a dam as this will prevent the loss of any considerable further quantity of water, and will render the water stagnant, so that a row or more of pile-planks can be drove to cut off the connection with the breach, which can then be emptied of water, the hurdles and straw removed, and the reparation begun, with proper puddle-ditches for its security, as before described. At the famous Dagenham breach of the embankment of the *Thames*, dove-tail, or plank-piles were used, we are told. It will be necessary to defend many places of the banks of a canal that are obliged to be unusually steep, as in the approach to a bridge or lock, a wharf, &c. with a facing of planks, called *camp sheeting*; this consists of strong piles driven into the bottom of the canal, with the proper inclination, with horizontal pieces, or land ties to their tops, on to which piles sound and durable planks are spiked. In some places, owing to the accidental or unavoidable admission of very thick water into a canal, or in more cases by the ordinary deposit in length of time, the canal will become choked with mud. In these cases a machine with buckets, like a chain pump, to scrape the bottom of the canal, and afterwards discharge the load of mud into a barge, might be used, such a machine, worked by horses, being now in use in the *West India Docks*. See also *Walker's Lectures*, 4to. p. 35. The late Mr. Brindley, we are told, contrived a plan for the purpose of clearing the docks at Liverpool from mud.

By neglect it will sometimes happen in canals, that *Weeds* grow up from the bottom, and form an unsufferable impediment to the motion of the barges; and this is almost unavoidably and generally the case in river navigations, if constant care is not used to tear them up, or cut them down. On the great *Ouse*, and other fen rivers, a machine has been long in use, called a *beaver*, for tearing up strong weeds by the roots.

About the year 1796, the *chevalier Bentancourt Molina* presented to the *Society of Arts*, a model of a barge, having a windlass in its stern, which gives a circular motion to a pair of knives or scythes, or a lever giving an alternating motion to knives for mowing off weeds close to the bottom of a canal, in which the barge is to float, or on the sloping sides of the canal; for which purpose, the knives can be made to revolve at any depth below the surface of the water, and either horizontally, or inclined in any angle; this model may be seen at the society's house in the Adelphi, and a description and view of it will be found in their *Transactions*, vol. xiv. p. 345. or *Repertory*, VI. 169. In most winters it happens, that an ice not more than an inch or an inch and half

thick, continues for a considerable length of time on canals, and other stagnant waters; this, or even a less thickness of ice is sufficient to stop the trade upon canals, unless the ice is broken; and, for this purpose, it is advisable, every morning of a frost, unless the ice should be found more than usually thick, and the frost increasing, and likely to continue, to break the ice on each pound; this is usually and effectually done by a strong and square headed barge, whose sloping or projecting head is covered with strong iron plates. One of these barges being drawn along the canal, and into each lock, by several horses, has a constant tendency to rise up upon the ice, and thereby breaks it down before the barge: about the lock-gates it will be necessary to break the ice by stamping with the end of a pole. Mr. Symington, whose barge, with a steam engine in it, to propel it along, and tow other vessels, we have lately mentioned, has provided the head of his barge with stampers, to be worked by the engine, for breaking of the ice before it, in frosty weather.

Leaks in a canal may sometimes be stopped without emptying the water, if the depth will permit it, by preparing good puddle in a flat-bottomed dirt-boat or flat, and dropping the same in spadefulls equally over the surface, and when a certain length is done, raking the same about with a rake, with short teeth to join the pieces together, and level the bottom. The difference in specific gravity, in different loams and earths, is so considerable as to make some of them much more proper for the lining and facing of a canal than others; the heaviest that can be found should be used when leaks are to be stopped, and the water remain in the canal as above. We have passed along the branch of a canal on a chalk soil, where the lining of the bottom was so light, that the motion of the barge stirred enough of it up into the water, which was before nearly clear, to make it almost as white as milk behind us; this light stuff has since been taken out, and a substantial lining and facing of proper stuff brought in barges for the purpose, and laid on the bank before the water was let out, has been applied, by an able engineer, who succeeded those of too different a description who constructed this very leaky branch.

Some *Implements* and machines are used in the making or working of inland navigations, which we have not had occasion yet to mention or describe. In every considerable work it will be necessary to erect rolling-stones for grinding and preparing of the cement or mortar that is to be used in the water-works. At Worsley, on *Bridgewater's* canal, the power of a water-mill is applied to turning several pair of large stones on edge, like those used by tanners, gunpowder-makers, &c.; in some of these the stones rolled round on a fixed stone, in others a large cast-iron flat pan, in which the materials to be ground were put, was turned round under the stones, which were thus made to revolve round their own fixed axis on the materials. What appeared singular in the process at this place was, that the lime and other ingredients were ground with water for a long time, in the state of thin mortar, which was then removed into cisterns to dry, and before the same was become too hard, it was cut out by a spade, into lumps of about half a cubic foot each, and heaps of them were preserved in a store-room, where they became quite dry, and as hard as chalk, or harder, for use at distant periods of time, in the repairs of the walls and works under water. At the *London* and *East India* docks steam-engines, of twenty horse power in one case, were used for grinding their cement; but the pozzolana, lime, and other ingredients are here mixed and ground together in due proportion in a dry state (as *Parker and Co.'s* patent Roman cement is done), and it is not wetted, but carefully preserved from

from moisture, till a very short time before it is to be used in the walls, &c. See the article ROLLING-STONE.

The *driving of Piles* is a very considerable business in many large concerns; at the entrance of the *London Docks* a steam-engine was erected for driving the vast number of piles which were required for the coffer-dam. Mr. *S. Bunce* contrived a very simple and effective kind of pile-driver, to be worked by men at a winch. Mr. *Harvey* contrived a double pile-driver, which is described in the *Transactions of the Society of Arts*, vol. xii. p. 337. The horse pile-driver contrived by Mr. *Vauloue* cannot, from the almost innumerable models, plates, and descriptions which have appeared of it, since the building of Westminster Bridge, be unknown to any of our readers. Mr. *John Fould* contrived a machine, and presented a model of it to the *Society of Arts*, (see their *Transactions*, vol. xiii. p. 280) for cutting off the tops of piles, after they have been drove, beneath the surface of the water. See the article PILE.

Some of the navigator's tools and implements, as barrows, horfing-blocks, grafting-tools, shovels, and scoops, we have represented in figs. 48 to 52, *Canals*, Plate VII.

Cranes for the hoisting of goods will be required on the wharfs of canals and rivers. See our article CRANE.

On the *general management*, and office department, of a canal concern, it is unnecessary to enlarge. The committee with which the conduct of it is entrusted will, without doubt, direct their attention to those various circumstances on which its prosperity depends. Accordingly, they will appoint proper officers in the several subordinate departments, and give them such instructions for the regular discharge of their duty as occasion may require. It may not, however, be improper to suggest, that the canal committees should direct their resident engineer to establish proper rain and evaporation gauges at several lock-houses upon the line, to be kept by the lock-keepers, and registered daily or weekly with great care: these observations, preserved in the company's books, or, what would be better, published in some of the magazines, would prove of great advantage to science, and to canal undertakings in general. In canals of considerable length, particularly if some parts of them are indifferently and variably supplied with water, or leaky, it will be right to fix gauges or graduated rods on each upper lock-gate, that would shew at all times how many inches depth of water there is at the time, in the shallowest part of that pound; and to cause the lock-keepers to mention the same at the foot of the printed permits or pass tickets, that the toll-clerks should give to every bargeman who passes, containing the number and description of each barge, and the description and weight of its loading; these, transmitted regularly to the toll-collector, would enable him, or some other person, to keep for the information of the committee, a register of the daily state of each long or leaky pond of water; at the same time that the lock-keepers, toll-clerks, &c. at each extremity, and on different points of the canal, would always be acquainted with the state of the water, and the loading which a barge could pass with at every particular place; and could inform bargemen; for want of which knowledge great delay and expence are often incurred, in dry seasons, by setting off with more lading than can be carried through, for want of a sufficient depth of water, and part of the same is obliged to be left on the road, or taken into other boats. All the regulations contained in the act, for working of the canal, and such by-laws as the committee may see it necessary to make, for regulating the conduct of the bargemen and others on the canal, should be printed, and stuck up at every wharf on the canal, and in every toll-clerk and lock-keeper's house; and all the company's agents and servants

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should be strictly enjoined to notice every breach of laws and regulations, not by altercation with the offenders, but by immediately noting down in writing the exact and true particulars of the time, place, and name of the offenders and bye-standers or witnesses, &c. transmitting the same immediately to the committee, and preserving a copy thereof themselves: and, though we are far from recommending severity in punishing on these occasions, yet a system of this sort, by shewing the offenders that the committee would always be prepared to proceed against them, would, in most instances, especially if the parties were written to, to threaten them, go a great way to prevent the same parties or others from offending again.

Tonnage Tables, fully and explicitly stating the toll or tonnage payable to the company, on goods or articles of every different kind, or on different parts of the line, if, as often happens, these vary, should be printed and stuck up on all the wharfs and toll-houses, for preventing all doubts or altercations between the company's servants and the traders. At some convenient place on the line of the canal, a *weighing-house* should be prepared, consisting of a dock under cover, large and deep enough to contain the largest vessels which are to navigate the canal; this dock should be furnished with a draw-gate to let down, or doors to shut, when an empty barge has entered, in order to render the water quite still within the dock. Cast-iron or leaden weights of 2 cwt. each should be provided, and a crane to hoist the weights readily in or out of the barge, and place them in any part of the same, so as always to load her evenly. To this weighing-house, the act or by-laws should require every barge to be sent, having the name thereof, and the owner's name and residence previously painted on the stem of it, before it is allowed to trade on the canal: the empty barge being arrived in the dock, the gauging-master fixes four small plates of iron, each containing the number that this barge is in future to be distinguished by, two on one side, and two on the other, against the gunwale, near the head and stern. These plates are all fixed at the same distance from the surface of the water, when the barge is empty; this distance, in inches and tenths, is entered into the gauging-master's book, under the number of the barge, name, owner's name and residence, date, and other particulars; two tons of weights are then hoisted into the barge, and regulated until the distance from all the four plates to the water's surface is the same, which distance in inches and tenths is also entered in the book against two tons; two tons more of weights are then hoisted in and adjusted, and the height of the number-plates above the water is taken and entered against four tons as before; these operations being repeated until the utmost lading of the barge is on board, when the weights are taken out again, and the barge removed from the dock. For measuring the height of the plates at the Paddington weighing-house, a tin tube is used, that is furnished with a float moving freely in it, to mark the surface of the water, which carries a light stick graduated to inches and tenths, to show the height of the number-plate against which it is applied. At every toll-house on the *Grand-junction* canal similar floating-rods are kept, and to every laden barge which passes this gauge is applied against the number-plate, at each end, and to those on the other side, if the barge appears to heel at all to either side. If the dry inches and tenths shewn by the gauge, between the number-plate and the water's surface, are different, they are added together, and divided by the number of them for the mean height. It is the business of the gauging-master to calculate, from the particulars entered in his book, of each barge as above, the weight to the nearest of $\frac{1}{4}$ of a ton, which answers to every inch and

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tenth of an inch, of the dry inches shewn as above by the gauge; the number of the barges are applied in a regular series, in the order in which they come to be gauged; and a book, containing a table for the tonnage on board, answering to every dry inch and tenth, as above, is calculated, and a copy of each is in the possession of each toll-clerk, by a reference to which, he fees and enters in his toll-book, and in the pass-ticket or permit, the number of tons and quarters for which tonnage is to be paid to the company. On a great number of canals the practice is different; the gauging-master prepares four slips of copper or lead, about $\frac{3}{4}$ of an inch broad, and $\frac{1}{8}$ thick, and stamps thereon at every division answering to two tons, agreeable to the observations entered in his book, and between these strokes are drawn to mark the intermediate tons and quarters of a ton. These plates he fees carefully nailed on to the sides of the barge, under the number-plate; by help of which the toll-clerk, and the bargeman also, can at any time see the tonnage on board, by the place on the plates cut by the water's surface.

Most acts contain a provision respecting barges occasionally navigating a canal, or any others where reason appears to the toll-clerk to suspect a deception or fraud, for requiring the bargeman to give an accurate account of his lading on board; which if unsatisfactory, the toll-clerk may take such barge to the nearest wharf where accurate scales, steel-yards, or engines for weighing goods are kept, and there have the cargo unloaded and weighed; which expence, as well as a penalty, the bargeman is made to pay, if he had refused or neglected to give an account of his lading, or if his account so given shall prove below the real weight of the goods. New barges are usually indulged, in two or three voyages, before they are gauged, in order the better to suit the bargeman's and gauging-master's convenience for doing it, during which they are subject to have their goods weighed, as they also are, whenever they have different goods on board, liable to different rates of tonnage, and do not give a satisfactory account of the weight of each.

In many acts there are clauses inserted to prohibit the planting of trees in the canal-hedges, or on its banks, as there are also in others, for restraining the company from erecting any houses or buildings on the banks of the canal, except certain specified public wharfs, unless for the immediate use of the canal. A clause will be necessary, to punish persons who are found throwing ballast or any kind of soil overboard or into the canal, by which it might be choaked up: it will also be requisite, strictly to prohibit the throwing of loose stuff, as chalk, gravel, sand, &c. by means of shovels, from heaps or barrows on the bank, into any barge, unless a broad and close stage of boards was first laid to catch the stuff, which will unavoidably scatter, and to prevent its falling into the canal.

Necessary tackle should be kept in readiness, for weighing up such barges that are sunk, without delay, on account of the total interruption that such will often occasion to the navigation. Where a sunk barge lies so that another barge cannot be floated on each side of it, the following method may be adopted: chains should be looped round the sunk barge and hooked, having four ends of sufficient length proceeding from near the four corners of the barge, two empty barges should be brought, one to each side of the sunk one, and strong beams of timber be laid across each of these barges, and the space between them; water should then be admitted into each of the barges by their plugs, to sink them almost to the water's surface, the plugs should then be put in, and the four chains be fastened tight to the cross beams, when a pump should be used in each of the barges to throw out the water, and as this is accomplished,

if the chains are properly fixed, the barge will be buoyed up, often to the surface of the water, so that she may be freed by pumping her; if not, she must be shoved along, suspended between the light barges, to some strong crane, where she can be further assisted, or into some dock or shallower place, where she can be relieved by a repetition of the same process.

Several further *Regulations for working of Canals* require yet to be mentioned: They are such as relate to the penalties that should be provided in the act or by-laws for preventing bargemen from taking in above a certain weight, adapted to the size of their boat and the depth of the canal; and also for preventing such boats from damaging the lock-sills or bottom of the canal, or sticking fast to the interruption of other boats. The nature of the lading and the manner of disposing it in the boat, so that the sides of the bridges, &c. may not be injured, should be duly attended to. Penalties should be provided to punish those bargemen who suffer their boats to strike against any of the locks or bridges, or those who suffer their barge to lie either for unloading or any other purpose, so as to obstruct the passage of other boats. In some acts this penalty is fixed, by the hours that such interruption continues, and at an increasing rate. Boats left at wharfs or other places, on or by the line of the canal, should be moored at both their ends. Bargemen should be prohibited from fishing, or having tackle for such purpose on board. It should be provided, and made known by the by-laws, that barges or vessels going one particular way on the line, and on each of the branches, should give way for those they meet or have occasion to pass; and on narrow canals or branches, it should be provided, that when two barges that are meeting each other first come in sight, or one of them hails the other, that which is nearest to a passing place, shall stop at or go back to the same to let the other pass. Common trading barges and vessels, and all others, should be prohibited from passing any locks or moving along the canal except in the day-time, and for this purpose it is usual to divide the months of the year into three or four portions, and to specify the hour both morning and evening in each, between which the canal is to be open. Light boats, for the conveyance of market-goods, parcels, &c. are allowed on some canals, as the *Grand Junction*, to pass on during the night, their owner paying a specified sum for a licence for such privilege, engaging to employ the most careful and experienced boat-men, and to make good all damage which such boats may do to the works of the canal, or to the barges or property of other traders. Mr. *Thomas Pickford*, the great waggon proprietor, has substituted boats in place of many of his waggons, and which travel night and day, and arrive in London with as much punctuality from the midland and some of the most distant parts of the kingdom, as the waggons do.

As few of the tunnels are constructed wide enough for two wide barges to pass each other therein, it may become necessary in such cases, where the tunnels are long, to establish an overseer at each end of the tunnel, where a basin of sufficient dimensions for several boats to lie and pass should be provided, to suffer no barges to enter at either end for an hour, or other period, or until the last boat from the other end is come out, to prevent wide ones meeting others in the tunnel. If the number of wide boats be very small in proportion to the narrow ones, the periods for the entry of narrow boats may be oftener repeated, and wide boats might, in extreme cases, be only suffered to pass the tunnel between the two basins after dark in the evening, when the other boats are lying still on the canal.

Gentlemen's

Gentlemen's pleasure-boats, and narrow short husbandry-boats, for the use of the occupiers of the lands on each pound, are often allowed at very easy rates, if not quite free of tolls; and sometimes such, as well as any other boats laden with manures and road-materials, are allowed to pass the locks on the same conditions, at such times only as the water runs over the lock-weirs, or is within a very small quantity, as half an inch, of that height.

The regulations of vessels *passing the Locks* are usually very explicit in canal-acts, that boatmen may not suffer the water to remain in the locks longer than is necessary for their boats to pass; that every boatman in going down a canal, shall, previous to his bringing his boat into any lock, shut the lower gates of such lock and the cloughs thereto belonging, before he shall draw the cloughs of the upper gates; and, after he shall have brought such boat through the lock, he shall then shut the upper gates before he shall draw the cloughs of the lower gates, and in going up the canal, such boatman, as soon as he shall have passed his boat through the lock, shall shut the upper gates of the same, before he shall draw the cloughs of the lower gates, unless there shall then be a boat coming down the canal, in sight of the said boatman, in which case the lower gates of the lock shall be left shut, and the upper gates shall be left open; and in all dry seasons, or where there shall be a scarcity of water in the canal, the boat so going up (if within sight of a boat so coming down,) and at a distance not exceeding two hundred yards below a lock, shall pass through such lock before the boat coming down, and then such other boat shall come down into the lock; and if there shall be more boats than one, below and above any lock at the same time, in any such dry season, within the distance aforesaid (which distance shall be distinguished by a post set up for that purpose), such boats shall go up and come down at such lock *by turns*, until all the boats have passed, by which means one lock full of water may serve two boats. A penalty should be provided against any bargeman or other person, who draws the cloughs, except while barges are passing as above, or for leaving any clough open; as also against any lock-keeper or other servant of the company who gives undue preference to any boatman in passing the locks, or in unloading his barge at the public wharfs. Posts should also be provided by the side of the locks, for strapping or stopping the velocity of boats before they enter the locks, and penalties ought to be provided against the winding of their rope or strap round any part of the gates or lock, in order to stop a barge, except the strapping-posts before mentioned; after all, the engineer should be careful to form the heads of the gates, and all other projecting points about his locks, of such a sloping or wedge-like form, that the rope would have no hold upon them, but slip off. A clause should always be inserted in the act, for making master boatmen answerable for all damage done by their servants, giving them, however, the right of recovering from their servants in all cases of wilful damage or neglect. On some canals it is usual, for the masters to hire their men by the ton of goods which they navigate certain distances, instead of paying them by the day for their time.

For some time past, the rate of *Freight* on some canals, over and above the company's tonnage, has been two-pence per ton per mile, for unperishable goods, three-pence per ton per mile for perishable goods, and four-pence halfpenny for bulk goods. In times of distressing scarcity, like those of 1795 and 1800, the committees of several canals, have permitted the passage of imported grain, going towards the interior of the country, toll free, with the laudable intention of lowering its price to the community.

The *Principles of constructing River Navigations* require some further notice in this place, in addition to the particulars which we have already had occasion to notice respecting them in this article.

Mr. *Thomas Telford* has given an account of the navigation of the river *Severn*, which is printed in *J. Plymley's Agricultural Report of Shropshire*, pages 284 and 317, from which we shall collect some particulars, and remark thereon, with the view of shewing by an example, what are the nature and extent of the difficulties which navigation has to contend with, upon natural rivers. This justly famous river is navigable up to Welchpool, a distance of 155 miles by water, from the mouth of the Bath *Avon* river; the extreme branch of this river may be traced for about 45 miles above Welchpool, to Plinlimmon Hill, and numerous other branches extend for great distances into the country on both sides; the whole of this great length of river navigation was till lately unimproved by art, it having no locks, weirs, or other erections throughout its whole length for surmounting the numerous shallows and irregularities, which the current over variable *strata* had formed in its bed. The first, or lowest 42 miles of this river, extending to the city of Gloucester, are very wide for great part of the way, and have a most rapid tide; but the last 28 miles are so crooked, that ships are said to be often several days in passing it; on which account, a grand canal, calculated for vessels of 300 tons burthen, was in the year 1793 projected and begun, between *Gloucester and Berkley*, of $18\frac{1}{2}$ miles in length, for avoiding these 28 miles of the river. From Gloucester to Worcester the distance is 30 miles by the course of the stream, the rise in this length being 10 feet, or at the rate of 4 inches in a mile: from Worcester to Stourport the distance by water is 13 miles and the rise 23 feet, or at the rate of 1 foot 9 inches per mile: from Stourport to Bridgenorth it is 18 miles, and the rise $41\frac{3}{4}$ feet, or 2 feet 4 inches per mile on the average; and, from Bridgenorth to the New Town at the junction of the *Shropshire* canal, called *Coal-port*, the distance is about 7 miles, and the rise about 19 feet, being a rate of about 2 feet 8 inches per mile. It was, we believe, that excellent and public-spirited individual, Mr. *William Reynolds*, the founder of *Coal-port*, who caused an account to be daily registered, of the depth of the stream in the bed of the *Severn* river at that place, between the 7th of October 1789, and the 23d of December 1800, of which Mr. *Telford* has given us the particulars, except on 12 occasions when the river had overflowed its bounds and covered the usual marks, on Sundays during some part of the time, the intervals of frost in which the river was frozen over, and for three short intervals, when unfortunately the experiment was by some accident suspended. These valuable materials we have examined with considerable care, and shall present our readers with some results therefrom, that will be of use in judging of the interruptions from floods, drought, and frost, to which river navigations are liable; and we do not apprehend that this river is more subject to them than the British rivers are in general, excepting those smaller ones like the Colne, the Wandle, and others, which are supplied principally by spring-waters. During all the months of *January*, in the above period of 11 years, ending the 6th of October, 1800, the river was twice overflowed, (2d Jan. 1790, and 27th Jan. 1800,) and exceeded, we should suppose, the depth of 16 feet, that being the greatest depth at any time recorded; and several times, when no depths are inserted to the great floods, it is stated in the table that the water was above all the marks: besides these, there were 32 smaller floods, or times when the water had risen, and was falling again for some days after; the highest of these had a

depth of 13 feet (5 Jan. 1790,) the lowest 4 feet, and the mean of the whole of these floods is $7\frac{1}{2}$ feet. In the months of *February*, there were two of these overflowings, one of which (11 Feb. 1795,) followed a frost, and continued for 5 successive days: 19 floods, the two highest of which were equal (17th and 20th Feb. 1799,) to 12 feet; the lowest that we have noticed was 4 feet, and the mean depth of water in all of them was $7\frac{3}{4}$ feet nearly. In the months of *March*, the bounds were but once overflowed, and we have noticed 11 other floods, the greatest height being 9 feet, (17th March 1794,) at which it continued 3 days, and the lowest $4\frac{1}{2}$ feet, and the mean height of them about $6\frac{1}{2}$ feet. During the months of *April*, two overflowings of the river are mentioned, the heights of 14 floods are recorded, the highest (5th April 1794,) 10 feet, the lowest $4\frac{1}{2}$ feet, and the mean $6\frac{1}{2}$ feet. In the months of *May*, but one overflow of the river is mentioned, (30th May 1792,) and 7 floods, the greatest depth of water at those times being $7\frac{3}{4}$ feet, (6th May 1797,) the least $4\frac{1}{2}$ feet, and mean $5\frac{1}{2}$ feet. The months of *June* produced no overflowings, but 8 floods are recorded, the greatest $6\frac{1}{2}$ feet deep, (4th June 1797,) the least $3\frac{3}{4}$ feet, the mean height of them being $5\frac{1}{4}$ feet. The months of *July* produced no floods which overflowed the banks or marks; of the 10 that are recorded, the highest was 7 feet, (1st July 1797,) the least $3\frac{1}{2}$, and the mean of them $4\frac{1}{2}$ feet. During the months of *August*, the highest of the 19 floods, or highest waters that are mentioned, was 11 feet, (19th Aug. 1799,) the least that we have noticed is 3 feet, and the mean height was $5\frac{1}{2}$ feet. The months of *September* produced 17 floods, the greatest $9\frac{1}{2}$ feet, (23d Sept. 1797,) the least $3\frac{3}{4}$, and the mean we find to be 6 feet nearly. In the months of *October*, one overflow took place (10th Oct. 1789,) and 24 other rises of the water or floods, the greatest being 10 feet, (10th Oct. 1799,) the least $4\frac{1}{2}$ feet, and the mean $6\frac{1}{2}$ feet. In the months of *November*, one overflow is mentioned, (1st Nov. 1792,) 28 other floods, the greatest of 11 feet depth (8th Nov. 1799,) the least $4\frac{1}{2}$ feet, and the mean $6\frac{1}{2}$ feet. Lastly, in *December* in the several years, two overflowings of four days each are recorded, (1st Dec. 1791, and 2d Dec. 1794,) the number of floods being 29, the greatest height 16 feet (5th and 7th of Dec. 1797,) the least 4 feet, and the mean we find to be $7\frac{3}{4}$ feet in height.

From the above it results, that the *Severn* river at Coal-port is subject to about one overflowing of the banks annually, besides about 20 lesser floods, varying (in 11 years,) from 16 to 3 feet in height, the mean height of which is about 6 feet 7 inches. It also appears, that the greatest floods, and those occurring the ofteneft, are in December and January; that the fewest floods happen in May and June, and are the least in height in June and July.

We have now to mention the results of an examination for the lowest states of the stream of water in the river, in the above period. In all the *Januaries* the depth never was less than 1 foot 8 inches, on one of the two such occasions (13 Jan. 1793,) it continued so for three days. In *February* it never was but once so low as 1 foot 8 inches, and then (26 Feb. 1797,) it continued so for three days. In the months of *March* we have noted ten lowest states of the water, four at 1 foot 8 inches, four at 1 foot 6 inches, and two at 1 foot 5 inches (19 and 25 March, 1797,) the mean of these low-waters being 1 foot $6\frac{1}{2}$ inches. In the months of *April*, ten low-waters were observed, the greatest 1 foot 8 inches, and least 1 foot 2 inches (30 April, 1796,) the mean being 1 foot 5 inches nearly. During the months of *May*, eighteen low-waters occurred, the greatest being 1 foot 8 inches, and least 1 foot only, and which continued for seven successive days

(29 May to 4 June, 1795,) the mean being 1 foot $5\frac{1}{4}$ inches. In the months of *June* we notice twenty-three lowest states of the water, varying from 1 foot 7 inches to 1 foot, which last was the depth at four different periods, (two of which amounting to twelve days were in June 1791,) the mean of these is 1 foot $3\frac{1}{2}$ inches nearly. In the months of *July* the low-waters were thirty-one in number, varying from 1 foot 8 inches to 11 inches, (14 and 15 July, 1794,) the mean 1 foot $3\frac{1}{4}$ inches. In the months of *August* there appear to be thirty-three low states of the stream, the highest that we have noticed are 1 foot 8 inches each, and the lowest only 9 inches! (5 and 16 August, 1800,) the mean 1 foot 4 inches. During the months of *September* the low-waters were twenty-four in number, the greatest 1 foot 8 inches, and least 11 inches, (7 September, 1796,) the mean being 1 foot 4 inches. In *October*, in the different years, were twelve low-waters, from 1 foot 9 inches to 1 foot 1 inch in height, (3 and 4 October, 1791,) mean 1 foot 6 inches. *November* produced only three low states of the water, 1 foot 10 inches and 1 foot 8 inches, (8 November, 1791, and 11 November, 1796,) mean 1 foot 9 inches. Lastly, in the months of *December* four low-waters are recorded, 1 foot 9 inches, and 1 foot 7 inches, (9 December, 1793, and 20 December, 1799,) the former continuing for three days,) the mean of these being 1 foot 8 inches.

From the above it appears, that the *Severn* at this place is subject to between fifteen and sixteen low states of the water annually, and each of them will be found of much longer continuance than the floods are; the lowest having 9 inches only in depth of water, the greatest that we have here taken out being 1 foot 10 inches, and the mean of all such we find to be 1 foot $4\frac{3}{4}$ inches. It also appears, that it is not oftener than once in two or three years on the average, that a low state of the water (1 foot 8 inches) occurs in any of the four winter months, November, December, January, and February; that June and July are subject to the lowest waters, and July and August to the most frequent rises of the water; the reason of this last circumstance appears to be, that in this low state of the water, and when the breadth of the river is the least, the effect of almost every partial thunder, or other heavy shower, on any of the branches of this river, is visible in the same at Coal-port, which waters could not have been noticed, when the stream was so many times larger, as it generally is. We observe, that the mean height of the low-waters, in both August and September is 1 foot 4 inches, (the general mean of all the months being 1 foot $4\frac{3}{4}$ inches,) and if the mean of the six summer months, from April to September inclusive, be taken, it will be found almost exactly 1 foot 4 inches: what is also remarkable, the river has been found to be far more stationary at this particular height than any other, since, on thirty-five days, beginning with the 25th May, 1793, it never varied from that height, on eleven days, beginning 15 June, 1795, and on ten days, beginning 15 July, 1795, it also ran steadily at that depth; while it never remained but twice at any other height for ten days together, viz. fifteen days, beginning 23 September, 1795, at 1 foot 2 inches; and ten days, beginning the 14 August, 1795, at 1 foot 3 inches depth: but twenty-six instances occur in all the eleven years, of the water remaining for more than four days together at any other height than 1 foot 4 inches, several of these being very near that height; and, indeed, instances of a stable height are so rare, that often for months together no two following days are to be found alike. From the above we may, we think, with tolerable safety infer, that 1 foot 4 inches is the depth of the stream of water in the *Severn*, at Coal-port, 45 miles, below the upper end, and 110 miles above

above the lower end of its navigation, arising from springs; the height of water above this being principally occasioned by the rain, which so frequently falls in one part or other of the Welsh mountains and hilly tracts, whose running waters this river receives. Seven times in the above eleven years the *Severn* was frozen over at Coal-port; on one of these occasions the river continued locked up for 29 days, beginning the 11th January, 1795, the next longest interruption, from the river being frozen over, was nineteen days, after 27th January, 1798; fourteen days, after 1st February, 1799; fourteen days, after 20th December, 1799; thirteen days, after 2d December, 1796; eight days, after 22d December, 1796; and, lastly, three days, after 2d January, 1795. These amount in all to 100 days, or to about nine days of total interruption from ice annually, supposing they had happened regularly; but it appears above, that in only four of the winters in this period was the *Severn* froze over at Coal-port, viz. in that of 1794-5, for thirty-two days; that of 1796-7, for twenty-one; in that of 1798-9, for thirty-three days; and, in that of 1799-1800, for fourteen days; or, for twenty-five days on the average, in each frosty winter, while seven winters passed without such interruption. The water was generally low (in one instance only 1 foot 7 inches,) when the *Severn* became froze over as above, occasioned, we apprehend, principally by the rapid and great evaporation which will be found always to precede and accompany a frost; and by the frost having set in and retarded the fall of the waters, in the open and exposed parts of the country which supplies the *Severn*, before the same was become intense enough to cover that river with ice, in so deep and narrow a vale as at Coal-port.

Mr. Thomas Telford remarks, that the year 1796 afforded so striking an instance of the fluctuating nature of this river, that during the whole of that year, there were not two months in which barges could be navigated, even down the river, with a freight which was equal to defray the expences of working them; an interruption to trade that was severely felt by the great coal-masters and manufacturers of iron in those parts, in particular. The same intelligent engineer observes, when speaking of the *Severn*, "the inconveniences arising from the irregularities of the water have always existed in some degree, but they have been greatly increased by the embankments which have lately been raised to protect the low lands in Montgomeryshire, and in the upper parts of the county of Salop. Formerly, when the river had arrived at a moderate height it overflowed these lands to a great extent, which thereby operated as a side reservoir, and took off the top waters of the high floods; and these waters returning to the bed of the river by slow degrees proved a supply for the navigation, for a long time after the flood began to subside, but being now confined to a narrow channel, they rise suddenly to a great height, and flow off with more rapidity than formerly; whereby the navigation is at one period impeded by uncontrollable floods, and at another left destitute of a sufficient supply for its ordinary purposes." Besides the embanking of low lands by the sides of considerable rivers noticed above, another cause has been observed by us, for the change for the worse, which is well known to have happened to many of our navigable rivers, within the last 50 years; in which period, a great portion of the common-field parishes in England have been inclosed, and in the greater number of instances, new and straight brooks and water-courses have been cut therein, instead of the exceedingly crooked and serpentine courses which most of them had; these have had the effect of letting down the rain waters much more freely than formerly, from almost every branch of many of our eastern and some other rivers, and

have occasioned floods much more sudden and high than were probably ever before experienced; at Bedford, on the *Ouse*, we remember reading of two or three immense floods, within a few years past; such as would have effectually prevented the erection and growth of the fourth part of the town on its present site, if such floods had ever before prevailed; and the effects of these increased floods have been experienced in the fens, through which these rivers pass, by the continual necessity which has been found of raising their banks to prevent the water overflowing them, and filling the adjacent country. In the fens this remedy has been found adequate; and the evil might have been remedied higher up the same rivers, if attention had been paid to increasing the water-way under their bridges, erecting others in place of the numerous fords that on some rivers exist, and cutting off sudden bends in the course of the rivers; and above all, requiring the mill-owners to make more capacious flood-gates, to be opened on the first rise of water, in order that it may pass off by the channel, to prevent the valley being filled for a great distance above, and agriculture being interrupted or prevented, as it used to be in the smaller valleys above, before the brooks therein were straightened, or new ones cut. The same causes which have occasioned this increase in the rapidity and height of the floods, have, as observed by Mr. Telford, caused the quantity of water to be less in the rivers in the general; a circumstance which receives strong confirmation from an able pamphlet, said to be written by the late Mr. Wedgewood, in 1765, entitled "A View of the Advantages of Inland Navigation," wherein it is mentioned, speaking of the *Severn* river near to Coal-port, "that the lowest water that ever happens, in the driest summer, is never less than 18 inches, which is sufficient to carry vessels of 16 or 17 tons burthen at any time." We have seen above, that this river, since 1789, often runs with a stream no more than 16 inches deep for considerable periods together, and is frequently so low as not to have a foot depth of water in it, while instances of such extreme drought have been recorded, that the depth was reduced to 9 inches, or half what was formerly said to be its lowest state. The progress of agricultural improvements in the last age would have had a still more sensible effect, in producing a low state of the water in our rivers, after the sudden floods are run off, but for another, and contrary effect from the above, by which they are accompanied; we allude to the more general drainage and cultivation of the surface of the ground, by which it is enabled to absorb and take in so much greater a portion of every shower of rain than formerly, most of which water afterwards finds its way through land, or permanent springs, to the brooks and rivers, and prevents that very diminished state of them, which every dry season must now otherwise occasion. We may consider, that all land whose surface is wet, and in want of draining, is in that state as incapable of absorbing or retaining the rain waters, as the tiles of the roofs of houses, or the paved streets in a town are; and, that when that most essential of agricultural improvements, under-draining, has been applied, and the surface rendered fit for cultivation, that the whole of a large portion of the showers of rain, and a considerable portion of all of them, are absorbed and retained in the land, to be afterwards slowly given out, by the under-drains or springs, for equalizing the rivers. We were not fully aware of the great effects which a change to cultivation from a state of neglected common, has upon the absorbent powers of the soil, until viewing the improvements of the late excellent Duke of Bedford, in Crawley, in Bedfordshire, before mentioned.

In projected improvements upon any of our old river-navigations,

gations, or in extending the navigation thereon above the tide-way, it is of importance to examine the state of the whole country, to which the river in question acts as a drain, to observe accurately whether cultivation, or the breaking up of lands, and the practice of draining have been going on, or are likely to be so in any considerable degree, within a reasonable period; as also to observe particularly the state and extent of the valleys and meadows, over which the waters are or have been spread in ordinary floods, and the probability of such being further prevented by straightening or enlarging the beds of the brooks and rivers, or embanking the courses of the streams; these, with the most correct information that can be obtained from different millers and others, who live on the banks of the river, or from scientific individuals, who have caused accounts to be kept of the height of the water, will be necessary data for determining the magnitude and nature of the works which will be necessary on the proposed navigation.

Mr. William Chapman, in his *Observations*, often before quoted, page 74, when treating of the canals of China, which are in effect but new channels for a part of the streams of their rivers, takes occasion to introduce some useful observations on the crookedness and unequal sections of rivers, and on the effects of shallows, weeds, and other impediments, upon the velocity and height of the stream, that we must reluctantly for the present pass over, referring the reader to our article RIVER. As an instance of the fall and velocity of large natural rivers we are told, that the Ganges for 60 miles, having the mean width of 3-4ths of a mile, and depth of 15 to 20 feet, was found to have a fall, in a direct line, through the immense flats and rice-fields on its side, of 9 inches in a mile, but by following all the bends of the river's course, the fall was reduced to 4 inches per mile, and its velocity therein did not exceed 3 miles per hour. On ascertaining readily the velocity of streams of water, and comparing the same with theory, see *Nicholson's Journal*, 8vo. vol. iii. p. 32 and 87.

Mr. William Chapman seems to incline to the opinion, that locks may not always be eligible on river-navigations, and says (p. 87,) that "during the flooded state of rivers, all small falls are equalized, as they necessarily rise higher below than above a rapid; therefore I am far from saying, that running canals with a small fall are not, in many instances, eligible on the shores of great rivers; and that well devised stops, easily opened and closed, (not such as lift up like those described in China, nor open against the stream as gates,) are not sometimes preferable, to incurring the charge of locks. In other nearly similar instances where locks are eligible, their piers and gates alone, will be sufficient without any other floor or side walls, than a concave and battered pavement, continued through the bottom and up the sides of the space between the piers. The eligibility, and the particular construction of these works, will much depend on the nature and extent of the beds of the rivers, the difference between their low and flooded states, the height and also the permanency of their shores, and the quantity of floating ice.

The greater number of rivers through which new navigations are now required to pass, will be found occupied by mills, at shorter or longer distances from each other, according to the fall of the water in most instances; at the tail of most of such mills, will be found a large and deep pool, which the fall of water from the mill-courses and flood-gates has torn and excavated, and a short distance below this pool a shoal or bed of gravel, or other matters, will in general be found, that would prove so expensive to remove, and would in general be so subject to accumulate

again by a further excavation of the pool from the increased fall of the water into it, that it will in general be the cheapest and most effectual way to begin a new cut for the navigation below this shoal, and continue the same up by the side of the pool to the bank of the mill, wherein a pound lock must be constructed, either of timber or masonry, for gaining the ascent to the mill-dam or upper pound. In rapid rivers subject to great floods, the utmost care and attention of the engineer to the construction of such works will be necessary, to prevent their being demolished by the first flood perhaps after their erection. Where mills do not intervene, and rapid and of course shallow places occur in the bed of the river which is to be made navigable, a side-cut must be begun from above such shallow, and if practicable at the beginning of a considerable bend of the river which the side-cut may cut off and shorten; in continuing this side-cut downwards towards the place where the lock is to be placed, and the junction below the same is to be formed with the river below the shallow, care must be taken to conduct the side-cut, which is to be upon a level as far as the lock, as soon as possible across the flat meadows to the borders of the high ground, along which it should skirt, to the place of the lock, if this is practicable, on account of the width of the meadows; otherwise a counter-drain or parallel cut must be taken up from below the lock, as far as is necessary, on the land side of the side-cut, to drain off the water, and prevent a swamp or pond being formed above the lock and between the side-cut and the high ground, as is almost invariably done by the ancient mill dams on most rivers and streams: it is, however, with the utmost care and precautions that the counter-drain should be adopted, otherwise, in time of floods, when the meadows are overflowed, such a current would rush into and down the declivity of the counter-drain as to endanger the tearing thereof, and of the bottom and sides of the cut or bed of the river, into which it vented below the lock. We have seen large and expensive sluices erected upon and near to the vent of counter-drains circumstanced as above, of greater height than the top of the floods, which were found necessary to be built, and kept shut on the approach of a flood to prevent the action of the counter-drain, until the flood had subsided so far as not to overflow the meadows adjoining the counter-drain. Across the bed of the river at the most convenient place below and near the upper end of the side-cut, an opening-weir must be constructed, by which the water in the river can always be kept at a proper height for covering the shallows and bed of the river to a proper depth for the navigation; several of these opening-weirs have within these few years been constructed on the *Thames*, one of which near Windsor has been described and drawn by Mr. Zach. Allnutt in his *Considerations on the best Mode of improving the River Thames*, 1805, p. 22. It consists of several strong piles or posts driven firmly into the bed of the river at 20 to 25 feet apart, in a straight line across the river: the intervals between these piles are driven and nicely filled up with pug-piles, or dove-tail piles, as before described in this article; these last are afterwards sawed off straight and even with the bottom of the river, and have a strong and sound sill nicely fitted and spiked on to them, and into each of the large piles at its end; by this means the water is prevented from soaking or making its way, except through the rectangular openings between the several piles, which should be at least as high as the highest floods, and have their tops connected by strong cross pieces of timber bolted on to them; in these cross pieces, and in the sill below, a number of holes are prepared for placing at equal intervals as many upright pieces of wood, called rimers, with rebates in their sides, for

for temporary gates to slide down in, and rest against; after these rimers are put in, a sluice or gate, with a tall handle to rest against the upper, or cross piece, is put in between each rimer; and, above these, another set of gates, called overfalls, with similar handles, are fitted, to be occasionally used in dry seasons, when none of the water is to be suffered to escape, except by the side-cut and lock-paddles. In time of floods, all these gates, overfalls, and rimers, are taken away, by persons who go in a boat for that purpose; which operation, we are told, can be performed in three hours, and the water is suffered to take its free course through the openings: as the water subsides, a few of these gates are put in at a time, leaving the water its course through the others, until all of them are in, when on any small rise of the water, the same falls over the tops of these gates into the bed of the river below; when a greater depth of water is wanted above, the overfalls or upper gates are successively put in upon the others; these last being of such a height that the water can fall over their tops before it would overflow the meadows in case of its rising, and the men not attending or being expeditious enough in taking away the overfalls, and then the gates, if the progressive rise of the river should render it necessary. Mr. J. Plymley in his report before quoted, page 316, has given a plate of a weir of this sort for a river, which is called a gate-sluice, with 17 gates, but we have looked in vain for any description or account thereof in his volume. In the *Thames* and several other rivers, *Jetties*, or *Weir-bedges* have formerly been made, for diminishing the width of the river below the several shoals, in order to make a deeper but narrower and more rapid current over the same, as is done, we are told, on the China canals; but the rapid and dangerous currents which these and the under-water weirs occasion, particularly in high water times, have been so justly and loudly complained of, that we trust the same will, ere long, give place to the side-cuts, pound-locks, and opening-weirs, above described. The principles on which jetties are made to raise the water in rivers, and the mode of calculating their effects may be found in *Nicholson's Journal*, 8vo. vol. iii. p. 35.

For improving the navigation of rapid, confined, and variable rivers, like the *Severn*, Mr. Thomas Telford, in *Plymley's Report*, p. 287, has recommended the deepening of the lower part of the bed of the river in the shallow places, in order to equalize the declivity and current of the river: a very experienced engineer has suggested, that deepened shallows, without jetties or similar constructions, would soon be again filled up in many cases. In the higher parts, Mr. T. proposes to erect solid and durable weirs of masonry across the river upon the shallow places, with side-cuts and pound-locks by the side of them, for the navigation; and the river when thus diverted, may, as he justly observes, be applied to many important purposes of machinery, and for irrigating of the meadows, which would thus be brought within its reach. There is no doubt but this method is practicable, and would ultimately answer well; but the expence would be very great of erecting substantial weirs, and making the banks of the side-cuts, and walls, and gates of the locks, high enough to prevent the floods from breaking over into them, a condition which seems necessary, if barges are to be able to proceed at all times; the towing-path should also for the same purpose be made up with a regular sloping bank next the river, presenting no inequalities or projecting objects to catch or wear the towing-lines, so that its top or path shall be always above water. On a river which rises 16 or 17 feet or more, these works would be attended with a most serious expence and difficulty, particularly where cliffs rise almost perpendicularly up from the bed of the stream. Machinery on such

a stream, unless great expence indeed was incurred to obviate it, would be subject to have its work interrupted by every large flood: the working of barges on a river with such cuts, locks, and towing-paths, as we have mentioned, would be attended with considerable difficulties; tall masts must be used for attaching the towing-line in dry-times to bring the line on a level, or nearly with the horses, and in floods it must be fixed lower down, or to a shorter mast: and, in such cases, the utmost care might not always be able, where the works are necessarily confined by rocky banks, to prevent barges from sometimes missing the entrance of the side-cut, and being precipitated down the current over the weir, and being sunk. A towing-path, locks and banks of a less height, so that the floods would frequently cover them, besides their being totally useless in such times, would be liable to be damaged and washed away, (unless constructed in the most careful and expensive manner,) and the cuts and locks to be filled up in a great measure by sand, or gravel, in rapid rivers. Mr. William Reynolds set an example which has since been followed, on a great length of the *Severn's* bank, of constructing a towing path for horses, instead of the devious way over projecting rocks, loose sands, mud, and every other obstacle which the men who used, from time immemorial, to perform the slave-like office of hauling the barges along, were obliged to travel: we are not acquainted with the height of these new towing-paths, or whether they are at times, and how frequently, covered and useless by reason of the floods. Mr. Allnutt informs us, that one horse commonly tows a barge of 130 tons burthen down the *Thames* above Richmond, at the rate of two and an half miles per hour. While on the running canals of China, *sir George Staunton* observed a boat of a light construction, with only 14 tons lading, of eight feet width of floor, about 10 feet width of water-line, and 50 of extreme length, drawing two feet three inches of water, and sharp at the ends, dragged against a stream whose velocity was $5\frac{1}{2}$ English miles per hour; and, although there were 28 trackers, or men hauling at the line fastened to the boat, besides three men in the boat poling it on, it advanced only at the rate of $\frac{1}{4}$ of a mile an hour; although the channel was not materially constructed in either width or depth of water-way, in proportion to the section of the boat. Mr. Thomas Telford has (p. 288.) proposed another method of improving the *Severn* river, by collecting "the flood waters into reservoirs, the principal ones to be formed among the hills in Montgomeryshire, and the inferior ones in such convenient places as might be found in the dingles, &c. along the banks of the river. By this means, the impetuosity of the floods might be greatly lessened, and a sufficient quantity of water preserved to regulate the navigation of the river in dry seasons, and likewise to answer many other useful purposes, such as the forming ponds for inland fisheries, the supplying of artificial canals, and the watering of land. This, it is thought, might even prove the simplest and least expensive mode of regulating navigable rivers, especially such as are immediately on the borders of hilly countries." An engineer of the first reputation in his profession (Mr. Rennie,) intimates, that after what has been said respecting the excess of flood water in the river *Roch* above the ordinary supply, the idea of correcting the floods of the *Severn* by reservoirs, must appear to be ridiculous. Mr. William Jessop, on another occasion already referred to, says, that the rivers may be rendered nearly uniform throughout the year by reservoirs.

The old clumsy stone or brick bridges upon rivers are a very principal interruption to the navigation thereon, by preventing the continuation of the towing-path in a place where it is generally the most wanted to surmount the rapid fall occasioned by the contracted water-way under the

bridge; the masts of vessels are also obliged to be struck. These circumstances recommend the more general imitation of the spirited individuals near Coalbrook-dale, who have there erected two cast iron bridges over the *Severn*, whose single and capacious arches remedy these evils. We have already spoken of them under the article BRIDGE, and in the present one, and therefore proceed to the only remaining subjects that at present occur to us, relating to the deepening of rivers: the *heaving of ballast*, or taking up of sand, gravel, or other loose or soft matters from the bottom of rivers, is usually performed by a strong pole, having a flat ring or hoop of iron fixed on its end, to which a strong leathern bag is fastened, like what is called a landing-net among fishermen; or for taking up gravel only, a fine and strong net is used instead of the leathern bag; the edge of this hoop is made sharp, so as to strike into the bottom, when a man pushes it down by its pole; near to this hoop a rope of considerable length is fastened, which is held by a man that stands at the head on the gunwale of a barge at anchor, while another man at the stern strikes the hoop and bag into the bottom, the man at the head then hauls at the rope to drag the bag along and scrape the bottom, while the other man shoves down the pole to which it is attached, until the bag is filled with sand, gravel, or other matters, which are wanted to be got up; the man with the rope then advances nearer to the other, and pulls up by the rope while the other does the same by the pole, and brings the bag over the side of the vessel, and empties its contents into the hold or room of the barge. If the bottom be hard, or the bag large, two or more men are employed to pull the rope, and sometimes a winch and roll on which the rope or chain winds, are used for dragging the hoop and bag along the bottom, and for hauling the same up to the surface, when the man at the pole finds that the bag is full, and begins to pull instead of push by the pole: this is the employment at Woolwich of a great number of convicts, instead of their being transported. Solid matters or rocks when they happen to want excavating, below the level that the water can be drawn off to, or the ebb of the tide, seem to require all the skill and resources of the engineer. Near to the entrance of the new *East India Docks*, in the way of ships in the river *Thames* at Blackwall, is a rock or large stone of exceedingly hard silicious pudding-stone, consisting, as we have been informed, of the hard small chert pebbles which abound so much near London, embedded in a cement still harder than themselves; detached blocks of which pudding-stone are by no means uncommon in the *London strata*; this rock is so hard that no tool is capable of boring it, and though for some years past the committee for improving the port of London have been occasionally advertising for persons who were willing to undertake or contract for removing the upper part of this rock, about 40 feet in length and 30 in breadth to the depth of about 18 feet, yet the rock still remains. The conduct of this business is now, it is said, committed to Mr. *Jessop*, an able engineer; and we hope soon to hear of this dangerous impediment being effectually removed.

Having now given the principles and practice of canal-making, and of river-navigations and rail-ways, as forming one great, compound, and connected *System of Inland Communication*, we now proceed to give a concise account of all the different establishments of this kind in the United Kingdoms. This part of the present article, although far short of the degree of perfection which we were desirous of giving it, has been attended with great labour, in research for the scattered, and often scanty materials, that are to be found respecting many of these undertakings, which will ever remain as stupendous monuments of British enterprise and spirited exertion.

Respecting the method of arrangement, we found it inexpedient to follow those who have attempted to give an account of some of these concerns, in the order of time in which they were projected or begun; because so many of them, in distant places, were projected at the same periods, while some were quickly begun and completed, and others remained a great while in hand.

The great length of some of these works or undertakings, the shortness of others, their various directions and their general and multiplied interfections with each other, rendered any geographical arrangement of them, as from north to south, or otherwise, equally difficult and improper. We trust, therefore, that our readers will approve of the plan which we have adopted, of giving the whole of these undertakings, rivers, canals, rail ways, &c. in one alphabetical series, arranged according to the *incorporate, or parliamentary name* of each, where the same are under special acts of parliament. And, as many important lines of canal have been surveyed and described, but never since were executed, we have thought it right to preserve the memory of many of such, by giving them a place in the regular series, but printing their titles in *Italics*, to distinguish them from the works existing or now proceeding with, which will be printed in small capitals. Our principal aim has been to exhibit, as concisely as possible, the principal features of each concern, and to trace its connecting points with all the other adjoining ones; by the help of which, it is hoped that our readers may be able to trace out and comprehend this great and unparalleled system of improved inland communication, which has, and will continue to operate so powerfully towards our national prosperity.

ABERDARE CANAL. This undertaking was begun under an act of the 33d of Geo. III.; its general direction (beginning at its lowest end, as we shall always do in these descriptions) is about N.W.; it is $7\frac{1}{2}$ miles in length to Aberdare, besides an extension thence, in nearly the same direction, by a *rail-way* for $8\frac{1}{2}$ miles further; it is situate in the county of Glamorgan in South Wales, and is not far from the sea-coast, or very greatly elevated above the same. The great coal and iron mines, and works near Aberdare, Tŷmôr-Vaughan, &c. seem its principal objects. It begins in the *Glamorganshire* canal near Eglwysfa, and terminates in the *Neath* canal at Abernant. The first $4\frac{1}{2}$ miles of the canal are level, and thence it rises 40 feet to Aberdare. Mr. *Thomas Dadford, jun.* is the engineer. A lock of sufficient height, with proper side-weirs, was made near the lower end, to prevent the *Glamorganshire* canal from suffering by floods, that may make their way into and through this canal. The company may raise 33,500l. shares, 100l. each. The rates of tonnage are too long for such an abridged account as this; they will be found in *Phillip's 4to. History of Inland Navigation, Appendix. p. 38.* Boats 12 feet long and 5 feet wide may be used, free of toll on the pounds, by the adjoining occupiers, for their husbandry purposes. At Aberdare works are some curious machines; one is said to be a pair of water-wheels, working one below the other like a figure of 8.

ABERDEENSHIRE CANAL. Acts 36 and 41 of Geo. III.—The general direction is about N.W. for 19 miles in length, in Aberdeen county in Scotland; it is near the sea-coast, and is not greatly elevated in any part; the principal objects seem the supply of the town Aberdeen, the exportation of granite stone from the famous quarries on its banks, and to form a communication between the harbour of Aberdeen and the vales of the river Don. It begins in the tide-way in the *Dee* river in Aberdeen harbour, and follows the course nearly of the Don river, in which it terminates at Inverury bridge; and passes the parishes of Old Machar, Newhills, Dyce, Kinnellar and Kintofe.

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tofe. The rise is 170 feet by 17 locks; the width of the canal is 20 feet, and depth of water $3\frac{1}{2}$ feet. The harbour of Aberdeen, (connecting with the *Dee* river near its mouth, at the S.E. end of this canal), was surveyed many years ago by Mr. *John Smeaton*, and lately by Mr. *Thomas Telford*, who has, in his reports to parliament, recommended making it capable of receiving ships of 18 or 20 feet draught of water. It appears that this canal was completed and opened in June 1805. The company might by the first act raise 30,000*l.*, shares 50*l.* each; and by the 2d act 20,000*l.* more might be raised on 20*l.* shares, bearing 5 per cent. interest. Half-mile stones to be erected. Pleasure-boats of twelve feet long, and four broad may be used on the pounds.

ADUR RIVER. The general direction of this river is nearly north for 12 miles in the county of Suffex: its objects are the import of coals, deals, &c., and the export of farming produce. New Shoreham and Steyning are considerable towns on or near it. It commences in the sea at Southwick below Shoreham harbour, and terminates at Bines-bridge in West-Grinstead. In September 1805, notices were given of the application for an act for extending this navigation from Binesbridge to Baybridge in Shipley.

Alford and Wainfleet. In July last (1805) a survey was ordered for an intended canal from Wainfleet haven to the town of Alford, the general direction of which line is nearly north, and about 12 or 13 miles in length, in the county of Lincoln: this line is near the coast, and seems but very little elevated above the sea: its principal objects seem the supply of Alford, and the export of husbandry produce: it is proposed to pass the town of Burgh. Wainfleet haven is said to be a very good harbour for trading ships.

ANCHOLME NAVIGATION. Act 42 of Geo. III.—The general direction of this navigation is nearly south: it is almost straight (except the last four miles), and about 26 miles in length, in Lincolnshire. It is situate within 15 or 20 miles of the coast, and runs nearly parallel thereto through fens and level grounds for great part of its length. Its objects, besides a better drainage of these fens by a wide and straight cut, instead of the old course of the river Ancholme, seems the supply of Market-Raisin and of Caistor (by means of the *Caistor* canal, which joins it at South Kelsey), and the export of husbandry produce. It begins in the tide-way in the *Humber* river near Winttringham, and extends to the town of Market-Raisin, passing near the town of Brigg.

ANDOVER CANAL. Act about the 30th of Geo. III. Its general direction is nearly north, and pretty straight, following the course nearly of the *Anton* river (which is navigable to Rumsey) for $22\frac{1}{2}$ miles in length, in Hampshire; it is near the coast, and not very greatly elevated in any part above the level of the sea. Its general objects seem to supply fuel to the country, and to export its surplus of farming produce. It connects with the *Southampton and Salisbury* canal, the latter entering it at Red-bridge, and leaving it again at Kimbridge mill. The town of Southampton, near its south end, is the 68th in the order of British population, having 7,913 inhabitants. This canal begins in the tide-way in *Southampton-water* at Redbridge, and terminates at Barlow's mill near the town of Andover; the towns of Rumsey and Stockbridge being on its course. Its rise is equal to 176 $\frac{1}{4}$ feet, and it is fed at its upper end from Pilhill brook. This line was surveyed by Mr. *James Brindley* in the year 1770, and an act proposed, but the opposition of the land-owners prevented one being ob-

tained, until it had been again surveyed in 1789, by Mr. *Robert Whitworth*; in a few years after which it was completed for use.

Arklow and Ovoca. In 1792, Mr. *William Chapman* surveyed the vales of the Ovoca river in Ireland, and recommended to render the improvement of Arklow harbour, which was then intended, more beneficial to the adjacent country, by connecting therewith a system of small canals up the rapidly ascending vales of the Ovoca, by rising 70 or 80 feet at once in proper places, by some of the substitutes for locks, of which we have before spoken.

ARUN RIVER. This navigation has nearly a north direction for 15 or 16 miles in the county of Suffex. To supply coals, and export farm produce, seem its principal objects; which are facilitated by the *Arundel* canal, that joins it near Stopham bridge, and would be further accomplished, were the *Surry iron rail-way* extended to it at Wisborough-green bridge, as was proposed in the year 1801. It proceeds from the sea at Arundel haven to Wisborough-green bridge, passing the town of Arundel in its course.

ARUNDEL CANAL. Act 31 of Geo. III.—The general direction is west for about 11 miles, following the course of the river Rother, in the county of Suffex. It is about 12 or 13 miles from, and nearly parallel to, the sea-coast, above which it is but little elevated. The supplying of the inhabitants with coals, and exporting of husbandry produce, seem the principal objects of this canal. It commences in the *Arun* river near Stopham bridge, and terminates at the lower plat near Midhurst, with a side cut of about one mile in length to Haslingbourn bridge in Petworth parish. The line being through the parishes of Stopham, Coldwaltham, Bury, Fittleworth, Ergdean, Coates, Sutton, Petworth, Duncton, Burton, Tillington, Lodsworth, Selham, Amberham, Eafebourn, Woolavington, and Midhurst. This canal is the property of that public spirited nobleman the earl of Egremont, but open to the use of the public, on paying certain specified tolls.

ASHBY DE LA ZOUCH CANAL. Act 34, Geo. III.—The general direction of this canal, though in a serpentine course, is nearly north, 40 miles in the counties of Warwick, Leicester, and Derby. It commences near and almost upon the grand-ridge on its eastern side, and near its other extremity is tunnelled through a yet higher side-branch of the great ridge. The conveying away of the coals and lime-stone from this last ridge, and the supply of the towns on its borders by means of the *Coventry* canal, with which it connects, are its principal objects. Coventry, which is near it, is the 24th town for population in Britain, having 16,034 inhabitants; while Hinckley, which is upon the line, has 5,070 persons, and is the 120th in order. Market Bosworth and Ashby-de-la-Zouch are other considerable towns near or on the line; the commencement of which is at Marston bridge near Nuneaton, on the *Coventry* canal, and the termination is by a *rail-way* (of $3\frac{3}{4}$ miles) at Ticknal lime-works; there also is a *rail-way* branch of $6\frac{1}{2}$ miles to Clouds-hill lime-work; another to Mr. *Wilke's* Measham collieries of 5 miles: a cut of $2\frac{1}{2}$ miles to Swadlingcote coal-works; another of $\frac{7}{8}$ mile to Staunton lime-works; another is to be made to Stanton Harrold park (if desired by the earl of Ferrers, the proprietor thereof); and there is another short cut of 200 yards to Hinckley wharf. The first $30\frac{3}{4}$ miles of this canal are level, extending to Oakthorpe engine on Ashbywolds, and forming with parts of the *Coventry* and *Oxford* canals, a level of 73 miles in length, being, without the branches, the longest in the United-Kingdoms, and rendered more singular by being on so high a level, as to cross the grand ridge with-

out a tunnel. From Oakthorpe engine to the Boothorpe feeder, $1\frac{1}{4}$ mile, is a rise of 140 feet, thence the summit level of $4\frac{1}{4}$ miles extends, through the principal tunnel to its north end; thence to the Cloudhill branch, $\frac{1}{2}$ of a mile, is a fall of 84 feet, and thence to Ticknal works is it level. The Cloudhill, Swadlingcote, and Hinckley branches, are level with the line, and the Staunton branch falls 28 feet therefrom. On this canal are two tunnels, one near Ashby de-la-Zouch town of 700 yards in length, and the other near Snareton of 200 yards. At Shackerton and at Snareton there are aqueducts; and at Boothorpe a reservoir with a steam-engine for pumping up its water into a feeder for the summit-level of the canal. The rail-way branches, and some part of the canal were completed previously to May 1802, but it was not until about May 1805, that the whole of the line was completed and opened. The company were authorised to raise 200,000*l.*, the amount of shares 100*l.* each. Public wharfs are provided on Ashby woulds, and at Green-hills near Sutton Cheney. Sir George Beaumont, the owner of collieries at Coal-Orton, to which rail-ways had previously been made at great expence connecting with the *Leicester* navigation, is to be compensated, and the company may purchase certain annual quantities of his coals for such purpose. This company is also bound to indemnify the *Leicester* navigation, and to allow them a rate of 2*s.* 6*d.* per ton on all coals carried upon this canal or its branches beyond a certain point from the coal-pits in the neighbourhood of their water-levels or rail-ways. To the *Coventry* canal company they are also bound to pay 5*d.* per ton for all coals, and some few other articles, which pass upon any part of this canal or its branches, and afterwards upon any parts of the *Coventry*, the *Oxford*, or *Grand Junction* canals, or from either of those canals to this: and for duly enforcing this last compensation, the *Coventry* company are authorised to erect toll-house and bars, and station their own collectors when and where they may chuse upon the works belonging to this company. The rates of tonnage allowed, vary from 2*d.* to $\frac{3}{4}$ *d.* per ton per mile on different goods, while some articles are to be allowed to pass toll free. Our limits will not allow of stating these particulars, which will be found in *Phillips's History of Inland Navigation*, 4*to.* Appendix, p. 128. In June 1796, a survey was made by Mr. Whitworth for connecting the north end of this canal, by means of the proposed *Commercial* canal, with the *Trent and Mersey* and the *Chester* canals, and opening the long wished for communication between London, Hull, Chelster, Liverpool, Manchester, &c. for river-boats of 40 tons burthen. In consequence of the failure of this scheme, in the January following, it was proposed to extend this canal to the *Trent* at Burton, and to the *Trent and Mersey* at Shobnall.

AVON RIVER, (*Bath*.) The general direction of this navigation is about S. E., in length 26 or 27 miles, by a crooked course in the county of Somerset, and skirting that of Gloucester: it opens into the *Severn* river, and is most of it a tide-way. The objects of this navigation are as various, as the imports and exports of such large places as Bath and Bristol and a populous neighbourhood require; besides its connection with the *Kennet and Avon* canal, and the other canals therewith connected. The city of Bristol is the 7th place in the order of British population, having 68,645 inhabitants, and Bath is the 12th, with 32,200 inhabitants. The commencement of this river is in the King's road in the *Severn* river (here about seven miles wide), and its navigation ends at Bath, near the commencement of the *Kennet and Avon* canal. About the year 1803, or 1804, an act was obtained by the *Bristol Dock* com-

pany, for converting about 70 acres of the old and crooked course of the *Avon* into a vast floating-dock for ships, and to cut a new channel for the river. About May 1804, these works commenced, under Mr. W. Jessop, and great progress has been made towards their completion. Two cast-iron bridges are erecting over the *Avon* near these works; one of them from Clifton-down to Leigh-down will, it is said, be 200 feet high above the surface of the water, and the other sufficiently high for ships to pass under it. That essential appendage, a towing-path, was wanting on this river, until the above company was established, who are making one on each side of the river, from Pill up to Bristol, and one thence to Hanham mills; from which place up to Bath, a towing-path is proposed to be extended, under an act, for which notices have just been given; this last part of the river is also intended to be improved in other respects. We have, also, lately seen a notice for a further application to parliament by the *Bristol Dock* company, for erecting a dam and overfall, with sluices, &c. at Red-cliff in Bedminster, to keep up the water for the new floating docks, and for other amendments of their former acts; in 1796 it was proposed that the *Kennet and Avon* canal should be extended to this river at Bristol. At Bitton below Bath, it was lately proposed, that the *Gloucestershire* rail-way should connect. In 1762, Mr. Stratford gave a design for a new stone bridge in Bristol of one arch, 150 feet span, and 32 $\frac{1}{2}$ feet high, which Mr. John Smeaton examined and approved; and in 1765, the last mentioned engineer gave a design and estimate for a floating dock nearly as above; after which, Mr. Campion made other designs.

AVON RIVER, (*Salisbury*.) The direction of this navigable river is very nearly north, and its length near 30 miles, in the counties of Hants and Wilts. The general objects of this navigation are the supply of Salisbury, and the adjacent country, and the export of its agriculture products. Near Salisbury, it connects with the *Southampton and Salisbury* canal. Salisbury contains 7,668 inhabitants, and is the 70th place in the order of our population; Fording-bridge, Ringwood, and Christ-Church, are likewise considerable towns on the line. The commencement is at the sea in Christ-Church harbour, and termination at Salisbury. The locks and works of this navigation had not been long completed, before a sudden flood happened, which swept away the greater part of them; in which state it lay until 1771, when Mr. James Brindley surveyed its course, and recommended a new canal by the side of the river; this was not however adopted, but the river-works have since been repaired; and the imperfection of them, was, we believe, among the most powerful motives for the adoption, in 1795, of the *Southampton and Salisbury* canal above mentioned. Mr. Smeaton examined Christchurch harbour in 1764, and recommended another pier to be built west of the old one.

AVON RIVER, (*Stratford*.) The general direction of this navigation is about N. E. by a crooked course of near 40 miles in Worcestershire and Warwickshire: the lower end thereof is but a few feet higher than the tide-way. The trade thereon is very various, depending in a great measure on the connection which it forms between the *Severn* river and the *Stratford* canal. Tewksbury, Pershore, Evesham, and Stratford, are considerable towns upon it. It commences in the river *Severn* at Tewksbury, and terminates at Stratford on Avon, near the junction of the *Stratford* canal. George Perrot, esq. is the proprietor of this navigation, and entitled to certain tolls, which were not to be lessened by the new communication with the *Severn*, which the *Worcester and Birmingham* and *Stratford* canals were to open, but they

they were, by the act for the latter concern (33 Geo. III.), to make good any falling off in these tolls. About 1792, the *Stratford and Croxley* was proposed to proceed from this river at Stratford to the *Oxford* canal.

AXE RIVER. The general direction of this navigation is almost S. E. for about 11 miles in length by a crooked course in the county of Somerset: it is but little elevated. Its chief objects are the import of coals, and export of farm produce, Axbridge being the only town of any importance upon it. It commences in the Bristol channel near Uphill, and terminates near Axbridge. An act of the 42d Geo. III. passed, for altering and improving that part of it which is between Bleydon and Axbridge. At Blean the *Bristol and Taunton* canal was once proposed to join this navigation; as the *Exeter and Uphill* also was designed to do at Uphill.

Axmouth and Langport. In 1769, Mr. James Brindley surveyed this line, which is nearly north, and about 30 miles in length, in Devonshire, Dorsetshire, and Somersetshire, crossing the south-western branch of the grand ridge. The objects of it seem to have been the supply of coals, exporting the products of the country, and opening a communication between the south coast and the Bristol channel, by means of the *Parret* river. Axminster, Chard, and Ilminster are the principal towns which this line was to approach; commencing in the tide-way at Axmouth, and terminating in the *Parret* river at Langport.

AYRE AND CALDER NAVIGATION. Act 9 or 10 of Will. III. The general direction of the *Ayre* river is nearly west, for about 40 miles by a serpentine course, from which the lower part of the *Calder* river branches, nearly south-west, by a crooked course of about 15 miles, all in the West Riding of Yorkshire. The first of these rivers, though an internal one, begins near the level of the tide-way, and no parts of either of the navigations thereon are much elevated. The objects of this navigation were at first very considerable, in the imports and exports of the populous, manufacturing, and coal country through which it passes, and they are greatly increased, since it has formed part of the grand communications between the port of Hull, or the German Ocean, and the towns of Manchester and Liverpool, or the Irish Sea, by means of the *Leeds and Liverpool*, *Reichdale*, and *Huddersfield* canals, and others joining them. It connects near Snaith with a branch of the *Don* or *Dun* river; at Leeds, with some considerable *rail ways* extending to collieries from the coal-staith; near Wakefield it connects with the *Barnsley* canal. Leeds is the 8th place in point of population in Britain, having 53,162 persons, and Wakefield the 64th, with 8131 persons; Huddersfield, near it, is the 104th, with 5799 persons; Snaith, Selby, and Pontefract, are also considerable places near this navigation, which begins in the *Ouse* river near Armin (to which place 50 and 60 ton sloops come up), and terminates its north-western branch at Leeds in the *Leeds and Liverpool* canal, and its south-western branch at Wakefield in the *Calder and Hebble* navigation. It has also a branch of canal about $4\frac{1}{2}$ miles to the *Ouse* river at Selby, for shortening the distance to York, &c.; and another of $1\frac{1}{2}$ mile near Mathley, between the *Ayre* and *Calder* rivers, for shortening the voyage between Leeds and Wakefield. The boats generally used hereon are 56 feet long, $13\frac{1}{2}$ wide, and draw 3 feet water, with 28 tons of lading: these boats often go down the *Humber*, and round the coast, to the *Welland* and Great *Ouse* rivers. The proprietors are authorized to exact so high a rate of tonnage as 16s. per ton in winter, and 10s. in summer, between Leeds and the *Ouse*. It is provided in the *Huddersfield* act, 34 Geo. III., that if any communication is hereafter made with that canal to the eastward, the proprietors of this are to be compensated. The opposition of these parties proved

fatal, in 1769, to a canal which Mr. Brindley surveyed between *Selby* and *Leeds*.

BARNSELY CANAL. Act 33 of Geo. III. The first part of the course of this canal is south, and the remainder west, about 15 miles in length, in the West Riding of Yorkshire: its western end is considerably elevated above the level of the sea. The principal objects of it seem to be the export of coals and paving-stones, and forming a short communication with Rotherham and Sheffield (by the *Dearne and Dove* canal, with which it connects at Eyming wood near Barnsley), and Leeds, Wakefield, Halifax, Manchester, Liverpool, &c. Wakefield is the 64th town in the order of population, with 8131 persons; Barnsley is also a considerable town. This canal commences in the lower part of the *Calder* river, or *Ayre and Calder* navigation, a little below Wakefield town, makes a turn when it arrives at the *Dearne* river, and terminates at Barnby-bridge near Cawthorn; there is a branch of $2\frac{1}{2}$ miles to Haigh-bridge in Wooley parish, and rail-way branches to Barnsley town 1 mile, and to Silkstone $1\frac{1}{2}$ mile. From the *Calder* to the junction of the *Dearne and Dove* canal, about 9 miles, is a rise of 120 $\frac{1}{2}$ feet: this is effected by three locks together, near Agbridge, having a low level or side-cut brought up to near the upper pound, with a steam-engine for pumping up the water again, which is let down by the lockage; by 13 other locks near Watton, and a long side-cut, from which engines pump up the water to supply the pound above these; and, near Bargh-bridge, by 4 other locks, a side-cut, and engine. On the Haigh-bridge branch there are also 7 locks together, with a low side-cut, and a steam-engine for pumping up the water required for lockage. At Eym is an aqueduct-bridge. This canal is adapted to the use of the same sized boats as navigate the *Calder*. It is provided, that any rail-ways or stone-roads, that may be made northward from Bargh-bridge (or mill) shall be discontinued or removed, if a cut shall be made from the *Calder and Hebble* navigation, to connect herewith; also, that the steam-engine near Warmfield shall be so constructed as to burn its own smoke, to prevent any nuisance to the inhabitants. The company were authorized to raise 97,000l., shares, 100l. each. This canal was completed and opened 8th of June 1799. The rates of tonnage on different articles are various: some fixed at 6d. to 4d. for the whole length of the canal; and various others at 3d. to $\frac{1}{2}$ d. per ton per mile, with several exemptions, rates of wharfage, &c. See *Phillip's History*, 4to. App. p. 40 to 43. The engineers were Mr. William Jessop, Mr. William Wright, and Mr. Goll.

BARROW RIVER (Ireland). This is one of the rivers, for the improvement of whose navigation the Irish parliament granted several sums of the public money, between the years 1753 and 1771, amounting to 13,600l. It is probable that less than the half of this amount, raised and expended by individual proprietors, with that circumspection which self-interest can alone inspire, would have effected what, we are told, this expenditure has left very imperfect. At Portarlington and at Monasteraven this river was to be joined by different branches of the *Grand Canal*.

BASINGSTOKE CANAL. This line of canal was first proposed in 1772, as an extension of, or appendage to, the canal intended for shortening the course of the navigation of the river *Thames*, between *Reading* and *Maidenhead*; but it was some years before the first act for this was obtained, in 1778; the other act is the 33 of Geo. III. The general direction of this canal is nearly west, by rather a crooked course of 37 miles in length, in the counties of Surry and Hants; the summit-pound thereof of 22 miles in length is upon a high level, near the south-east branch of the grand-ridge on its north side. The principal objects thereof seem the import

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of coals, and export of timber and agricultural produce, from and to the *Thames*. Basingstoke and Odiham are considerable towns on or near its line, which commences in the *Wey* river at Westley, (about two miles from its junction with the *Thames*.) and terminates at Basingstoke. A cut of 6 miles in length, and level with the summit-pound, was proposed northward to Turgis Green, but has not yet been begun, as we understand. The first 15 miles from the *Wey* river has a rise of 195 feet by 29 locks to Daddbrook, (the part at each lock being about 7 feet) from whence to Basingstoke it is level: 45 ton boats are used on this canal. At Grewel is a tunnel, part of which intersects the chalk strata, (about $\frac{3}{4}$ mile in length) that had the misfortune of falling in; but the same has, we are told, been substantially repaired. At Aldershot there is a large reservoir for the supply of this canal, (which was begun in 1788 and completed in 1796, at the expense to the proprietors of 160,000*l*.) and a feeder from the river Loddon. There are 72 bridges over the canal, and several culverts across, to convey the water from the upper to the lower lands. The company were authorised to raise 186,000*l*. The prices of freight from Basingstoke to Hamborough wharf, London, for coarse and heavy goods, was, in 1800, 15*s*. per ton; to the dockyards, as far as Deptford, 16*s*.; and to Blackwall docks, 17*s*. per ton for timber, &c. The length of a passage is three or four days. In the year 1796 there was an intention of extending a branch from near Grewell tunnel, of about 22 miles in length, to the navigation that connects with *Southampton water*; about 1794 there was an expectation of its being joined by the canal which will next be mentioned; and in 1801, notices were given of an intended cut from Chilton-moor to Bagshot-green in Windleham; for want of these or some other junctions that shall throw a greater trade into it, this canal has, though improving, been as yet rather unproductive to the share-holders. In 1800 there was a proposal for extending the *Grand Surry* to meet this canal at the *Wey* river.

Basingstoke and Hampstead. About the year 1794, a line of canal was projected, and notices given, extending from the *Basingstoke* canal at that town, to the *Kennet and Avon* canal at Hampstead, 2 miles above Newbury, the length of the line was said to be 22 miles; we have since heard nothing of this scheme.

BELFAST to LOCH NEAGH. This line of canal was begun under an act of the Irish parliament several years ago, for forming a communication with the sea at Carrick-fergus Bay and the above inland lake or loch, as also for exporting marble from the quarries thereof near its line.

Belper Canal. In September 1801, notices were given for a proposed canal, rail-ways, &c. from the *Cromford* canal at Bull-bridge, to Black-brook-bridge, through the parishes of Crick, Heage, Ashley, Hay, Belper, and Duffield; all in Derbyshire.

Biggleswade and Hertford. Several years ago a proposal was made, for joining the *Ivel* river at Biggleswade with the *Lea* river at Hertford, by means of a canal passing the town of Hitchin, by which an internal communication between Lynn and London would be opened; but the difficulty of supplying a summit-level near Stevenage with water, seems a greater obstacle than the expected trade would pay for surmounting.

BIRMINGHAM (old) CANAL. Acts the 8th, 9th, 11th, 23d, 24th, and 34th of Geo. III. the last but one of which acts, unites the concerns of this company with those of the *Birmingham and Fazeley* canal below; but as these canals were constructed and remain under distinct provisions in the acts, and take different directions from the town of Birmingham, where they meet, we have deviated from our usual rule and continued them separate in our account. The

general direction of this canal is about S. E. and $22\frac{1}{2}$ miles in length by a crooked course, through the counties of Stafford, a detached part of Salop and Warwick: it skirts along near the grand-ridge on its eastern side, at so high a level as to cross it near its northern end without any deep-cutting or tunnel; and, in that high situation is wholly supplied by reservoirs for flood waters, or steam engines which pump-up the water again, after it has been let down for lockage, or out of old and disused coal-pits. The principal objects of this canal are the carrying away of the coals from the numerous mines on its banks and branches, and the manufactured goods of Birmingham to Liverpool, Manchester, &c. It connects near Farmer's-bridge at Birmingham, with the *Worcester and Birmingham*, at Tipton Green with the *Dudley* canal, and near Wolverhampton with the *Wyrley and Essington* canal. The great towns on and near the same are, Birmingham, the 6th in the order of population, containing 73,670 inhabitants: Wolverhampton, the 33d, with 12,565 persons; Walsal, the 47th, with 10,399 persons; Dudley, the 49th, with 10,107 persons; and Bilston, the 87th, with 6,914 persons: in the centre of so large and active a population as this, the wonder in a great measure ceases, that this canal, constructed and carried on under such peculiar disadvantages, should nevertheless have proved the most lucrative concern of the kind in the kingdom. This canal commences in the *Staffordshire and Worcestershire* canal at Aldersley or Autherly, near Wolverhampton, and terminates in the *Birmingham and Fazeley* canal, at Farmer's-bridge, near the upper end of the town of Birmingham, the line being double in two places, viz. at Tipton, where a tunnel of near 1000 yards, and a canal of $1\frac{1}{2}$ mile in length, between Bloomfield and Deepfield has been made since 1794, for avoiding a zig-zag loop round Tipton hill, of 4 miles; also at the Smithwick locks, where two canals with 3 locks on each have been made, since 1787, for accommodating the immense traffic which is hourly passing. The collateral cuts are very numerous, the principal one extends from near Bromwich to the town of Walsal, by a crooked course of $8\frac{1}{4}$ miles; from this branch nine or more branches strike off to as many coal-works, &c. on each side of it; the termination of some of these are, near Wednesbury town, at Broad-water engine, Toll-end, Bradley, Bilston, David's Ram-farm, and other coal-works: the lengths of all which are several miles. From the line there is also a cut of about one mile, to Oker-hill coal works; another to Messrs. Bolton and Watt's famous Soho foundery, and another to Newhall-ring basin and wharf in Birmingham. In the first mile and three quarters, the rise from the *Stafford and Worcester* canal is 151 feet, by means of 20 locks, then $18\frac{1}{4}$ miles are level; a descent of 18 feet then takes place, by 3 locks (on each of the two branches before-mentioned); the remainder of the line about $4\frac{3}{4}$ miles is level, to the junctions of the *Birmingham and Fazeley* and the *Worcester and Birmingham* canals at Farmer's bridge. The Walsal branch, where it leaves the line, has a fall of 18 feet by means of 3 locks, and about two miles further near Rider's-green, a further fall of 48 feet by 6 locks, whence to Walsal is level; the Toll-end branch has a rise of 15 feet by 3 locks, and the Bradley of 20 feet by 4 locks, all the other cuts being level. This canal was originally cut 28 feet wide at top, 16 at bottom, and $4\frac{1}{2}$ deep; but by constant wear and widening it is now 40 feet wide at the top on the average. The locks are 70 feet long and 7 wide in the clear, and the boats carry about 22 tons. At the coal-wharf near Farmer's-bridge, and at its side cuts, 40 boats can unload at the same time; the Newhall-basin of 2 acres, is for the unloading and loading of timber, stone, slates, and general merchandize, no wharfage is charged at either of these wharfs. Originally, there

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was a summit-level on the line of about one mile in length at Smithwick, 18 feet higher than at present, (of which 1000 yards was deep-cutting, 28 feet in the deepest part) and it was supplied until 1787, by a steam-engine at each end; when, owing to the increasing trade, this summit was cut down, and 6 locks removed, making the deep-cutting one mile in length, and 46 feet deep in one place; and though this work was $2\frac{1}{2}$ years in hand, and cost 30,000l. yet it was so managed, that the passage of boats was only 14 days interrupted thereby. There is a considerable reservoir near Oldbury, and another near Smithwick, with feeders for conveying their waters into the summit level. The celebrated Mr. James Brindley was the original engineer, and on the 6th of November 1769, he completed 10 miles of the line and branches next Birmingham, by which coals were first brought by water to that great town from near Wednesbury, and their price to the inhabitants was lowered at once from 15s. and 18s. to 7s. 6d. per ton! In October 1772, the line was opened, and in June 1799, the Walsal branch was completed. The proprietors were authorised to raise 115,000l. before the consolidation of this and the *Birmingham and Fazeley* concerns. At first the shares of this were 100l. each; but were by the second act 9th Geo. III. reduced in number and made 110l. shares; those created since the 24th Geo. III. are 170l. shares. The original tonnage on all goods, (excepting lime-stone) was $1\frac{1}{2}$ d. per ton per mile, and for lime-stone and lime, $\frac{1}{2}$ d. per ton, except for manuring of the lands of the adjoining proprietors, and road materials were allowed to pass toll-free; but the subsequent alterations in the several acts since would much exceed our limits to mention, those who are desirous of further information will find it in Mr. John Cary's *Inland Navigation*, 4to. pages 36 to 45. By the *Dudley* act, 25th Geo. III. this company are entitled to certain tolls on goods passing on or off of that canal to this; and, by the *Wyrley and Essington* act (32 Geo. III.) to other rates for the junction therewith; all which may be seen as above. About the year 1790, a cut was proposed from this canal (instead of the *Dudley* junction) to Netherton collieries $12\frac{1}{2}$ miles, by a tunnel through the grand-ridge near Oldberry, of 2,078 yards, and 184 feet under the hill: in 1796, a foundery and large works belonging to Messrs. *Bolton and Watt*, were erected on the banks of this canal 5 miles from Soho. This canal extending across a country full of coal, it was apprehended that the sinking of the old pits might damage the same, and the company have power to enter and examine mines to prevent their working within 12 yards of the canal, except by passages of 4 feet wide, and 6 feet high: for want of more strict attention to this, some of the branches near Wednesbury have been undermined and broke in, so as to cause the canal to be abandoned in that part. From some of the old worn out coal-mine shafts near Billstone, a lambent blue flame arises in the night, of which a great deal has been said and written. Proprietors of mines within 1000 yards of this canal, or its branches, may make *rail ways* thereto.

BIRMINGHAM AND FAZELEY CANAL. Acts 23d, 24th, 25th and 34th of Geo. III.; the second of these acts is for consolidating this concern with the old *Birmingham* above; but each part of the canal remains subject to its own original regulations, as above observed, and the last but one is for consolidating $5\frac{1}{2}$ miles of the *Coventry* canal herewith, subject to the original powers of the *Coventry* act (8th Geo. III.) under which it was set out and made. The general direction of this canal is S. W. exclusive of the late *Coventry* part, which lies in a direction between N. and N.W. from the original termination at Fazeley: the length of the whole is $20\frac{1}{2}$ miles in the counties of Stafford and Warwick: the whole of this line of canal is considerably elevated, but

particularly the S.W. end in the town of Birmingham, which is situate near the grand-ridge on its eastern side. The great objects of this canal are, the export of the manufactures of Birmingham towards London or Hull, and of coals; the supply of grain and other articles to Birmingham and its populous and busy neighbourhood; it connects with the *Wyrley and Essington* canal near its commencement at Whittington-brook, with the *Coventry* at Fazeley, with the *Warwick and Birmingham* at Digbeth, and with the *Worcester and Birmingham* canal near its termination at Farmer's-bridge. Birmingham, as before observed, is the 6th British town, with 73,670 inhabitants, and Tamworth near the line, is a considerable place. The commencement of this canal is in the detached part of the *Coventry* canal, at Whittington-brook, and its termination in the old *Birmingham* canal at Farmer's-bridge at the top of Birmingham town. From the N.E. entrance of the town of Birmingham, a branch skirts the town to the lower part of it called Digbeth, and there connects with the *Warwick and Birmingham* canal. From the detached part of *Coventry* canal at Whittington-brook, to its junction with the line of that canal at Fazeley, and thence past the small aqueduct bridges near Middleton-hall, about $8\frac{1}{4}$ miles are level with the *Coventry* canal; from thence to the aqueduct bridge over the Tame river at Salford, $9\frac{3}{4}$ miles, has a rise of 50 feet by 14 locks, thence to the Digbeth branch, near $1\frac{1}{2}$ mile, has a rise of about 71 feet by 11 locks; thence to the old *Birmingham* canal at Farmer's-bridge, about $1\frac{1}{2}$ mile, is a rise of about 85 feet by 13 locks; the Digbeth cut, of about $1\frac{1}{4}$ mile in length, has a fall of 40 feet, by 6 locks to the *Warwick and Birmingham* canal. The width of this canal is about 30 feet, and its depth $4\frac{1}{2}$ feet. The locks are 70 feet long and 7 wide in the clear, carrying boats with about 22 tons of lading. There are a wharf and basin at Digbeth for the accommodation of the lower part of Birmingham. The Salford aqueduct bridge has 7 arches over the Tame river of 18 feet span each. The Digbeth cut is tunnelled or rather arched over in the town of Birmingham; there is also a short tunnel on the line where the Liverpool road crosses. The *Coventry* company being unable for want of money to proceed with the essential part of their line, between Fazeley and Fradley, where it joins the *Trent and Mersey* canal, the latter company for the sum of 500l. over and above the actual expences, undertook to complete this length, by agreements of the 29th October 1783, which the act (of 23d of Geo. III. above) confirmed; this they accomplished, the half nearest to Fradley in January 1787, which the *Coventry* company in Oct. 1787 purchased of them, agreeable to the 23d Geo. III. (which occasions them now to have a detached length of canal); the other half, between Whittington-brook and Fazeley, was completed in October 1789, and on payment of the cost thereof by this company, it was conveyed and made over to them, agreeable to the act above quoted. On the 12th of July, 1790, the aqueduct bridge at Salford being completed, as well as the line of canal, the same was opened, and the water communication between Birmingham and Hull or London, was thereby effected. The sums of money to be raised for this canal, were not distinguished in the acts from what was intended for the extension and improvement of the old *Birmingham* canal, the amount of each share was 170l.; but the act 24th Geo. III. limiting the number of shares to 500, they seem now to be variable. The rates of tonnage are too complicate for us to attempt their particulars, and we must refer the readers to *J. Cary's Inland Navigation*, pages 40 to 44, and pages 75 and 77. By the *Warwick and Birmingham* act (33d Geo. III.) certain duties are secured to this on goods passing from or to that canal, which may be seen in *Cary*, page 44. It is provided that

that the tonnage per mile on coals, is to be the same on this and the *Coventry and Oxford* canals.

Bishopstortford and Cambridge. In the year 1785 Mr. *John Phillips*, in a quarto treatise, recommended a line of canal from the *Stort* river, at Bishopstortford, to the *Cam*, at Cambridge, either by way of Littlebury and the Granta river, or near to Royston by the upper part of the *Cam*; which might be done, he says, for little more than 20,000*l.* but no levels, or other essential particulars are given; nor do we hear of any such, when Mr. *R. Dodd* again revived this idea in 1803, and wished to make this line part of his *North London* canal.

Bishopstortford to Wilton. In 1789 Mr. *John Rennie* was employed by several gentlemen of Essex to survey and report on a line of canal from Hifs, near Wilton, on the Brandon or Little *Ouse* river, at the edge of the fens in Suffolk, to the *Stort* river at Bishopstortford; the distance from the little *Ouse* to Ugley, the beginning of a proposed tunnel (of $\frac{2}{3}$ of a mile) near Effingham, $45\frac{1}{4}$ miles, with a rise of $251\frac{1}{4}$ feet; thence to Fuller's-end, near Effingham, $2\frac{3}{8}$ miles, and level; and thence to the *Stort* at Bishopstortford, $4\frac{1}{2}$ miles with 80 feet fall; a cut was proposed to Burwell on a branch of the *Cam* river, and it was to cross the *Lark* river. Several large reservoirs were designed, and three tunnels, two of them being necessary to reach the town of Saffron-Walden, and to miss Audley park. The estimate was 175,000*l.* and a bill was brought into parliament, in 1790, for the same, but it there met a fatal opposition.

BLACKWATER NAVIGATION (Ireland). This river falls into Lough Neagh, and for extending a navigation therefrom to the Dungannon and Tyrone collieries, the Irish parliament, between 1753 and 1770, granted various sums of the public money, amounting to 11,000*l.*; a canal with 8 locks, terminating in a basin, was constructed before Mr. *Davis Duckart* the engineer was employed thereon; who, finding the three miles with 200 feet rise, which remained to do to reach the Tyrone collieries, to be too great for a canal with locks, he constructed, about 1776, four water-levels, with three inclined-planes, of 70, 60, and 50 feet rise, to connect them, on which small boats were made to ascend and descend, as we have already mentioned, these being the first *inclined-planes* for boats brought into use in the United Kingdoms; it appears, however, that these were soon laid aside in this place, and a *rail way* was substituted. This navigation was intended to connect with the *Newry* canal.

BLYTH RIVER. This river, between Northumberland and a detached part of the county of Durham, appears to be navigable but a small distance above Blyth harbour; but we understand it has several considerable *rail-ways* connecting with it, for bringing down the produce of the collieries to the shipping.

BOYNE RIVER (Ireland). This is one of the rivers on the east coast of Ireland, for which the parliament, between 1768 and 1771, granted 9,507*l.* for improving its navigation. At Edenderry it was proposed to be joined by a cut from the *Grand Canal*.

BRADFORD CANAL. Acts 11 and 42 Geo. III. The general direction of this short navigation is south nearly, and 3 miles in length, in the West Riding of Yorkshire. It is not considerably elevated: its objects are the export of coals, iron, and stone, the produce of the neighbourhood of Bradford, and the supply of Bradford town, which is the 95th in the series, with 6,393 inhabitants. It commences in the *Leeds and Liverpool* canal at Winhill, in Idle parish, and terminates at Bradford, where *rail ways* of considerable extent connect with it, one of them goes to the collieries and iron-works on Wibsey

Slack; and the descent is so steep that the waggons run down without horses, having their velocity regulated by a man who rides behind and uses the convoy or brake upon the wheels, as occasion requires. From the *Leeds and Liverpool* canal to Bradford is a rise of 81 feet by 8 locks; the width of the canal at top is 24 to 30 feet, and its depth is 5 feet; the locks are of the same width and length as those of the *Leeds and Liverpool* canal. The company were empowered to raise 6000*l.* in 100*l.* shares. Boats passing the whole or any part of the distance on this canal are to pay 6*d.* per ton for clay, bricks, stone, coals, lime, dung, and manure; and 9*d.* for every ton of iron, timber, and all other goods. This canal was finished in 1774. The last act was found necessary, in order to make good the title to some lands which had been long before purchased for the works.

BRECKNOCK AND ABERGAVENNY CANAL. Acts 33 and 44 of Geo. III. The general direction of this canal is about N.W. 33 miles in length, in the counties of Monmouth and Brecknock in South Wales; it begins a few miles from the coast, and soon after comes near and follows the course of the *Uske* river, no part of it being very greatly elevated. Its objects are the exportation of coals, iron, and other mineral products of the country round Abergavenny, by means of the *Monmouthshire* canal, and the supply of Pontypool, Abergavenny, Crickhowel, and Brecon towns, that are near its course. It commences in the *Monmouthshire* canal, 1 mile from Pontypool, and terminates at the town of Brecon; it has several *rail-way* branches: viz. to Abergavenny 1 mile; to Wain-Dew collieries and iron-works $4\frac{1}{2}$ miles (near $2\frac{1}{2}$ miles of this last being double on each side of the brook); and, to Llangroiney, $1\frac{1}{4}$ mile. From the *Monmouthshire* canal, the first $14\frac{1}{2}$ miles are level, to 3 miles above the Abergavenny branch, thence to Brecon is $18\frac{1}{2}$ miles, with a rise of 68 feet. Near its commencement it crosses the little river *Avon*, on an aqueduct, and shortly after passes a tunnel of 220 yards in length. The engineer is Mr. *T. Dadford* jun. The Wain-Dew rail-ways, and the canal above them, up to Brecon, appeared to be finished in June 1802, and by this time we expect the whole is completed, or nearly so. The company were at first authorized to raise 150,000*l.* and a further sum by their second act, shares 100*l.* each. The rates of tonnage are to be the same as those on the *Monmouthshire* canal, which see in *J. Phillips's History*, 4to. App. p. 18. Horses, mules, and asses are to pay 1*d.* and cows, or neat cattle $\frac{1}{2}$ *d.* each at certain toll-gates on the rail-ways. The *Monmouthshire* canal, on account of the great benefit this will confer on it in tonnage, agreed to pay this company in March 1794, the sum of 3000*l.* In May last (1805) it was proposed to extend a *rail-way* branch from this canal to connect with the river *Wye*.

Bredon Rail-way. About the year 1793 it was in contemplation to make a *rail-way* and canal from the famous lime-works at Bredon to the *Trent* river, opposite to Weston Cliff; and in consequence, a clause is inserted in the *Derby* canal act, of 33 Geo. III. binding them to make a cut from the *Trent* at Weston Cliff to the *Trent and Mersey* canal, which runs parallel with the *Trent*, whenever this scheme shall be adopted, in order to give this lime a readier course into Derbyshire.

BRIDGEWATER'S CANAL. Acts 32 and 33 of Geo. II., the 2d, 6th, (*Trent and Mersey* act) and 35th of Geo. III. The general direction of the principal line of this canal is nearly N.E. (and not a great way from its eastern end, a main branch goes off in a N.W. direction nearly); the length is 40 miles, in the counties of Chester and Lancaster. It begins in the tide-way; above which the whole of it is elevated 82 feet at low-water, except about 600 yards, which the locks occupy

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occupy to gain this ascent. The great objects which induced the late excellent and patriotic *duke of Bridgewater* to undertake and to expend a princely fortune on the completion of this canal were, the supply of the town of Manchester with coals from his estates near Worsley; the cheaper and more expeditious conveyance of goods, between Manchester and Liverpool, than the *Mersey and Irwell* river navigation then furnished; and between both of these places and the interior and most remote parts of the country, by means of the *Trent and Mersey* (which it joins at Preston Brook,) and its connecting canals. Other and more direct communications have since been made between it and the interior and eastern parts of the kingdom, by means of the *Rochdale* canal and those connecting therewith. Manchester is the 2d place in Great Britain for population, having 84,020 inhabitants, Liverpool the 4th with 77,653 inhabitants, and Warrington the 45th with 10,567 inhabitants, these towns being near this canal. The commencement of this canal is in the estuary of the *Mersey* river at Runcorn-gap, and one of its terminations in the *Rochdale* canal at Castle Field in the town of Manchester, the other (or Worsley branch) is at Pennington near the town of Leigh, the junction of these branches being at Longford bridge; near Manchester there is a communication with the *Mersey and Irwell* navigation, and *Manchester Bolton and Bury* canal, by means of Medlock brook. Under the town of Manchester are arched branches of the canal of considerable length, from one of which coals are hoisted up by a coal-gin, through a shaft out of the boats below, into a large coal-yard or store house in the main street, at which place the duke and his successors, are by the first act bound to supply the inhabitants of Manchester at all times with coals at only 4d. per cwt. of 140lb.; a circumstance which must have had a great effect on the growing population of this immense town within the last 40 years. At Worsley is a short cut to Worsley mills, and another to the entrance basin of the famous under-ground works or tunnels, of 18 miles or more in length in different branches and levels, for the navigation of coal-boats; some of which are as much as 60 yards below the canal, and others 35½ yards above the canal; these last, to which the boats ascend by means of an *inclined-plane*, that we have already described, extend to the veins of coal that are working at a great depth under Walkden Moor. Most of these tunnels are hewn out of the solid rock; from the lower one, the coals in boxes are hoisted up out of the boats, as they are in Manchester town mentioned above, and the whole of the lower works are prevented from filling with water, by large pumps worked by the hydraulic machine, which we have already mentioned in this article, and the water is thereby always kept at the proper height for navigation on the lower canal. Near Worsley, a branch of about 1½ mile in length, proceeds on to Chat-Moss and there ends, across which celebrated morafs, it was by the first act intended to proceed, to the *Mersey and Irwell* navigation at Hollin Ferry near Glazebrook; but, like the cut proposed by the side of the *Mersey* to Stockport (7½ miles with a rise of 60 feet) was never executed, and the necessity for them is now in a great measure done away, by other plans which have been carried into effect. The rise of 82 feet in the first 600 yards from the *Mersey*, by 10 locks, is the only deviation from one level on this canal (except in the Worsley coal-mines above mentioned); and this length of level water is further increased; by 18 miles on the *Trent and Mersey* canal which connects therewith, making in all 70 miles of level. The width of the canal at top is 52 feet on the average, and depth 5 feet; the boats that navigate between Worsley mines and Manchester are only 4½ feet wide, the

others are 50 ton boats or upwards; there are also numerous boats for passengers; large warehouses have been built for goods, at the Castle Field in Manchester adjoining the canal.

Besides the tunnels under Manchester and at Worsley mines, we have been through a short one in passing a gentleman's house and a church, we think at Groppenhall. On this canal are three principal aqueduct bridges over the *Irwell* at Barton, where it is navigable, and over the *Mersey* and *Bollin* rivers, besides several smaller ones, and many road-aqueducts. There are also several large embankments, one over Stretford meadows, is 900 yards long, 17 feet high, and 112 feet wide at the base; that at Barton bridge is 200 yards long, and 40 feet high; at Bollington is also a stupendous embankment. The principal feeders for this canal are Worsley brook, and the mine-water there collected, the Medlock brook at Manchester, and the lockage of the *Trent and Mersey* canal; and water, which never was scarce in this canal, must now abound, since the increase of supply by the lockage of the *Rochdale* canal.

Mr. *James Brindley*, the engineer, owed much of his well earned fame to the happy contrivance and complete execution which he displayed in every part of this great concern; since the decease of Mr. Brindley, Mr. *Gilbert* and Mr. *Benjamin Sothorn* his Grace's agents, have done themselves great credit, by the masterly manner in which they have conducted the canal concerns of their noble employer, and improved and extended his works, as Mr. *Thomas Bury* has also in the mining department, so intimately connected therewith. The tunnelling at Worsley, and the canal between that and Manchester, were begun immediately on the passing of the first act; on the 17th of July, 1761, the Barton aqueduct was completed, and coals were soon after conveyed thereby to Manchester. On the 31st of December, 1772, the 10 locks at Runcorn were opened; in August, 1774, two packet-boats began to proceed regularly part of the way between Manchester and Liverpool, and on the 21st of March, 1776, the whole of the works which were then intended were finished; the extension to Leigh has been made since 1795. The illustrious *duke of Bridgewater*, justly stiled the *father of British Inland Navigation*, died greatly lamented in March 1803, and left this immense concern, (which cost at first 220,000l. it was said, and probably in the whole twice that sum, as the tunnelling at Worsley alone has been estimated at 168,960l.), to *earl Gower*, the present proprietor, whose second son is to inherit it; the net profits are said now to be from 50 to 80,000l. annually. The tonnage has not been increased since the first act, although the length of the canal has been increased to nearly four times what was at that time intended; boats may navigate the whole course or any part on paying 2s. 6d. per ton. Vessels passing out of the *Trent and Mersey* at Preston-Brook and into the *Mersey* at Runcorn, or the reverse, pay 1d. per ton per mile for that distance; and all vessels passing to or from the *Rochdale* canal to this canal at Manchester are to pay, for paying stones 4d. per ton, and for all other articles 14d. per ton. It is provided, that flour shall not pay any tonnage on this canal, if the wheat whereof it was made had already paid. Irrigation, or watering of meadows, is practised in a very judicious and profitable manner, by water let out of this canal at Worsley and other places. The price of land-carriage for goods between Manchester and Liverpool was, on the passing of the Duke's third act, 40s. per ton, and by the navigation on the *Mersey and Irwell* 12s. per ton, but his Grace limited his price to 6s. per ton; yet, such has been the increasing trade of these two places, that it was in 1794

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seriously maintained, and made the ground of another proposed navigable communication, by a junction of the *Manchester, Bolton and Bury*, and the *Leeds and Liverpool* canals, that both the Duke's canal and the river navigation were inadequate to carry the trade between Manchester and Liverpool, and that the most frequent and ruinous delays were experienced by the merchants. In 1802, we find the idea again revived of a cut from the *Leeds and Liverpool* canal to the Leigh branch of this canal. About 1772, the *Liverpool and Runcorn* was proposed as an extension of this canal from Runcorn; in 1799, the *Manchester Bolton and Bury*, was proposed to be joined directly with this canal, by means of aqueducts over the Irwell and Medlock at Manchester.

Bristol and Gloucester. In the year 1797, we were told, that surveys were making of the line for a proposed canal from the Bath *Avon* at Bristol to the *Severn* at Gloucester, and also, of a continuation of the same across the Stratford *Avon* to the *Severn* at Worcester.

Bristol and Taunton. Several years ago, a canal was proposed, we are told, from the *Avon* river at Bristol to the town of Taunton, with cuts to Nailsea collieries, to the *Axe* river at Bream, and to the town of Langport, but we are not further acquainted with its objects or particulars.

BROTHIC RIVER. This is a small river on the coast of Angers county in Scotland, and navigable, we believe, but a small distance up from the harbour of Aberbrothick at its mouth, which harbour is of great antiquity, and appears to have had piers and works erected for its improvement and security, so long back as the year 1194; the spring tides here rise 15 feet.

Bude and Hatherleigh canal. In 1793, the *earl of Stanhope* proposed a line of water-levels and rail-ways, between the sea in Bude Haven, on the Bristol-Channel part of the Cornish coast, and the neighbourhood of Hatherleigh in Devonshire, passing the town of Holdsworth, for carrying up sea-sand, (which in this bay consists of a congeries of broken shells), as a manure, and exporting of farming produce; the rise on this line was upwards of 500 feet, up which his lordship proposed, that his 2 ton boats should be conveyed at proper intervals on inclined-planes, whose peculiarities have been already mentioned in this article. In April last (1805), we find a scheme on foot, for improving the harbour of Bude and building a pier for the protection of ships.

Bude and Launceston, or the *Tamar* canal. This is one of the few instances, in which an act (14th of Geo. III.) was obtained, without any part of the scheme having been carried into effect. Mr. *Edmund Leach* the projector of this, in his Treatise on Inland Navigation, proposed, that it should proceed from the tide-way in Bude Haven, Cornwall, on the Bristol Channel, and proceed near to Launceston, and into the tide way in the river *Tamar* near Calstock, in the S.E. part of Cornwall. There was a provision, that the powers of the act were to cease in 10 years, if the canal was not proceeded with; it was proposed, to purchase only 39 feet wide of land, and not to be allowed to cut more than 39 inches deep into the earth on the lower side, in any part, except for docks, &c.; the canal to be 21 feet wide at top and 12 at bottom, with a towing-path on each side of it, 10 ton boats to be used; the direct distance of the two extreme points is only 28 miles, but owing to the extremely serpentine course of the level which was to be followed, its proposed length was 81 miles, and was estimated to cost 1000l. per mile. Locks were not to be used, but *inclined-planes* for boats of Mr. Leach's contrivance, of which we have already given an account in this article. From the sea at Bude, was to be a plane of 54 feet rise, thence a level of

6½ miles, then a plane of 120 feet rise, then 4 miles of level, and a third plane of 66 feet rise to the summit-level, which extended 34 miles to Launceston town, and 34 miles beyond; then, a plane with a descent of 120 feet, then 2½ miles of level, and a fifth plane, at Kelly Rock, of 120 feet fall to the *Tamar* navigation. A cut or feeder of 3 miles was proposed, from the *Tamar* is Lanells to St. Tankins on the Pack-saddle (being a low point on the south-western branch of the grand-ridge). Mr. Leach, however, tells us, that these levels are not to be entirely depended on, and mentions 258 feet as the elevation of the Pack-saddle. The principal objects of this canal were the carrying of salt and shelly sand from the coast into the interior of the country as manure (an object since in part accomplished by the *Tamar manure*, and the *Stover* canals). In 1785, Mr. Leach wished to revive this project, and to shorten the course to 40½ miles, by cutting down the summit 18 feet, and making a tunnel of 100 yards; and to form another communication with the sea at Weedmouth-bay, where the same broken shells abound; the cost was now estimated at 53,100l.

BURROWSTOWNNESS CANAL. The act of the 8th of Geo. III. (for the *Forth and Clyde* canal) established a set of proprietors for this canal; its direction being nearly west for about seven miles in the counties of Linlithgow and Stirling, in Scotland; from the tide-way in the harbour of Borrowstownness, on the Firth of *Forth*, to the *Forth and Clyde* canal, near its eastern termination at Grangemouth. Its objects are stated to be, the avoiding part of a dangerous and difficult navigation on the *Forth*, and for improving the lands of Kinniel and Beercrofts, through which it passes. Burrowstownness, Linlithgow and Falkirk are considerable towns near this line. The depth to be seven feet, and width and size of the locks at the entrance proportionable thereto, the canal being level. The company are authorized to raise 8,000l. the shares to be 50l. each. The tonnage of lime, lime-stone, and iron-stone ½d. per ton per mile, all other goods and articles (except road-materials and manures) 1½d. per ton per mile.

BURRY RIVER. This river, or estuary, connecting with the Bristol Channel, is between the counties of Caermarthen and Glamorgan, in South Wales, and is navigable a distance of ten or eleven miles to Lwghor or Llougher, in nearly an east direction; at the flats in Llanelly it is joined by the *Caermarthenshire* rail-way, and another rail-way has lately been laid from this river to the Penclawdd copper-works: in 1801, the *Llandorrey and Llanelly* canal was proposed to join at the Spitty in Llanelly; and, in October 1805, a wet dock was proposed to be made on the east side of the Llanelly pier, to communicate with the *Caermarthenshire* rail-way.

Caerdyke. This is an artificial channel or ditch, as ancient as the time of the Romans in this country, from the *Nen* river, a little below Peterborough, to the *Witham* river, three miles below Lincoln, of near 40 miles in length; it appears to have been very deep, though now almost grown up; and it is rather doubtful whether it ever was intended or used for the purposes of navigation.

CAERMARTHENSHIRE RAIL-WAY. Act 42 Geo. III.—The general direction of this line of rail-way is nearly north for 14 or 15 miles in Caermarthenshire; it commences on the coast, and is not very greatly elevated in any part; its general objects are the export of coals, iron, lead, &c. from the country through which it passes. Llandillo Vawr is the only considerable town near its course. It commences in the *Burry* river, at the new basin for ships, at the flats near Llanelly, and terminates at Castell y-Garry lime-works in Llanfihangel-Aber-bythick. In the deep cuttings for this

this rail-way near Mynydd Mawr several unknown veins of good stone-coal were discovered, and some of lead ore; in November 1804, the embankment near this place, consisting of more than 40,000 cubic yards of earth was completed, with the rail-way upon it. In October 1805, it was proposed to make a wet-dock for ships at the commencement of this line, on the east side of Llanelly pier; in 1801, the *Llandoverly* and *Llanelly* canal was proposed to pass through nearly this line of country.

CAISTOR CANAL. Act 33 Geo. III.—The direction of this line is east 9 miles in the county of Lincoln; it is but little elevated above the sea. Its objects seem the importation of fuel and other articles, for the supply of Caistor town, and the export of farming produce: it commences in the *Ancholme* navigation, at South Kelsey, and terminates at the town of Caistor. The company were empowered to raise 25,000l., shares 100l. The rates of tonnage are from 2d. to 8d. per ton per mile on different goods, with other rates for corn, &c. See *Phillips's 4to. History*, p. 47. All stores for the use of government, or materials for roads, to pass free at all times, and manures for the adjoining lands, when the waters run over the lock-weirs. In 1801, there was a proposal for extending this canal from Caistor, along the foot of the Wolds, southerly, to Hambleton Hill, in Tealby, near Market-Raisin, the expence of which was estimated at 6,500l.

CALDER AND HEBBLE NAVIGATION. Act Geo. III.—The general direction of this navigation is nearly west, about 23 miles in length, in the west riding of Yorkshire; it has a considerable elevation above the sea at its west end: the general objects are the communication between Liverpool, Manchester, and Hull, by means of the *Rochdale* and *Huddersfield* canals, and *Ayre* and *Calder* rivers, the import and export of goods from Halifax, and the export of paving-stone (now so much used in London, called Yorkshire paving) from the famous quarries at Ealand-Edge and Cromwell-Bottom, and lime from Houghton, Brotherton, and Fairburn: at Cooper's Bridge it is joined by Sir John Ramsden's canal (leading to the *Huddersfield* canal), and at Dewsbury by the *Dewsbury* and *Birfal* rail-way. Halifax is the 58th British town, with a population of 8,886 persons; Wakefield the 64th, with 8,131 inhabitants; and Huddersfield the 81st, with 7,268 persons. This navigation begins in the *Ayre* and *Calder* navigation on the latter river, at Wakefield, and terminates in the *Rochdale* canal, at Sowerby-Bridge. There is a rail-way branch of about half a mile to Bradley collieries; it has a cut of about half a mile in length by the side of the Hebble river, to Salter-Hebble; and provision is made (in 33 Geo. III. for *Barnsley*) for a cut to Bargh-mill, on a branch of *Barnsley* canal; there are several locks; one of them near Salter-Hebble, of 10 or 12 feet rise, was in 1783 removed, and two new ones, of half that height, with a basin between them, were substituted by Mr. *William Jessop*; some of the locks here erected in 1761, by Mr. *Smeaton*, have single gates at their heads. At Salter-Hebble are a basin and large warehouses, and others at Sowerby Bridge, for the accommodation of the town of Halifax; near Ealand is a large weir across the *Calder* river. This navigation was planned or superintended by Mr. *James Brindley*, and afterwards by Mr. *John Smeaton*. About 1765, the navigation was brought up to Ealand quarries, and about 1776, to Salter Hebble, and to Sowerby-Bridge warehouses. The stone and white slate from Ealand-Edge are carried in carts and four-wheeled carriages, to be put on board of the keels at Bridgehouse wharf, on account of the great height of the quarries above the *Calder*; the Cromwell bottom-stone is put on board at a wharf there. From the

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quarries of *Thomas Thornhill*, Esq. at Lillon's Wood, near Ealand, a long and wide inclined plane, of about 45° of elevation, was, about the year 1774, made from the *Oulder* river, and paved with large flat stones, on which a sledge descended loaded with stone, and by means of a rope passing over a wheel and axle, drew another empty sledge up the plane; this continued in use for some years; but this quarry was disused before the year 1783. In 1762, a violent flood happened on the *Calder* river, which destroyed many of the works thereon; these Mr. *Smeaton* repaired, and in 1774 another happened, so destructive that the navigation was for near a year suspended, before they were repaired; the fall of this river is no less than 8 feet per mile for more than 20 miles together. By the act 34 Geo. III. for *Huddersfield* canal, this navigation was guaranteed against a diminution of its tolls, by any other communication to the eastward opened therewith. In 1794, the *Manchester Bolton and Bury* canal was proposed to be extended to join this at Sowerby-Bridge. In 1802, the *Wilsey* and *Dewsbury* rail-way was proposed to join at Raven's Bridge, and notices have in the present autumn (1805) been given for the *Wakefield* and *Hullet* rail-way, intended to join this navigation at Bottom-Boat, near Wakefield; a side-cut is now making near Bridge-house, for avoiding the mill-dams, and improving this navigation.

CAM RIVER. The general direction of this navigation is about south-west, for 14 or 15 miles in the county of Cambridge; it is but little elevated above the level of the sea; its principal object is the supply of the town of Cambridge, which is the 51st in the order of our population, with 10,087 inhabitants: Ely also, near this navigation, is a considerable place. It commences in the great *Ouse* river, at Harrimere, and terminates in the town of Cambridge. It has a cut or reach of 3 miles to Reche, and another of 3½ miles to Burwell, at which last place the *Bishopstortford* and *Wilton* canal was, in 1789, proposed to join. The *Cam* river is embanked above the adjoining fens through all its lower parts, is without locks in some parts, and has sluices for making flushes of water, to enable boats to pass the shallows and hards.

CAMEL RIVER. The general direction of this navigation is about south-east for near 8 miles, in the county of Cornwall; it is within the flow of the tide, and is chiefly used in the import of coals and export of agricultural produce: it connects at Guinea Port, near Wadebridge, with the *Polbrock* canal. Padstow, on its banks, is a considerable town; it commences in the Irish channel, at Stepper Point, and terminates at Wadebridge.

Canterbury and Nicholas-Bay. In the year 1802, a canal was proposed, and again in 1804, and surveys taken, for a canal on a level, capable of carrying sea-built vessels, between the sea at St. Nicholas Bay, near Margate, to the city of Canterbury, about 10 or 11 miles in a south-west direction, there to connect with the *Stour* river, and with a canal then proposed, called the *Medway* and *Rolter* canal. Canterbury has 9000 inhabitants, and is the 57th place in the order.

CARDIFF AND MERTHYR-TYDVIL RAIL-WAY. Act about 35 Geo. III.—This line is nearly in a north-west direction, for 26¾ miles, in the county of Glamorgan, in South Wales. The general object of this rail-way is the export of iron from the great works at Merthyr Tydvil, Dowlais, &c. Cardiff, Caerphilly, and Merthyr are considerable towns on or near this line, which commences at the floating-dock, in the *Severn* at Lower Layer, the termination of the *Glamorganshire* canal, by the side of which, very nearly, it proceeds to Merthyr Tydvil, and thence to the lime-works at Panton, in Merthyr parish; at Quaker's yard a branch of

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0½ miles goes off to Carno mill, in Bedwellty; *Hornfray, Hill and Co.* are the proprietors of this rail-way or tram-road, and it was, we believe, constructed under the first act of parliament ever passed for this kind of roads; the width of land allowed to be purchased was 7 yards. On the 21st Feb. 1804, a trial was made of one of Trevethic's high-pressure steam-engines for drawing trams on this tram-road, as before mentioned, and 10 tons of iron and 70 persons were drawn for 9 miles by the power of steam, without the use of condensing-water. At Merthyr there is a curious and stupendous water-wheel, of 50 feet diameter, made of cast-iron.

CARON RIVER. The direction of this river is west, in the county of Stirling, in Scotland, and for 3 miles it is navigable, from the *Forth* river to Caron shore, for vessels drawing 7 or 8 feet water at neap-tides; at Caron shore there is a cut from the *Forth and Clyde* canal; and near Caron shore are the famous Caron iron-works.

CART RIVER. The direction of this navigation is nearly south, for about 3 miles in Renfrewshire, in Scotland; its objects being the supply, and the exports and imports of the great manufacturing town of Paisley, which is the 15th in the order of British towns, and contains 31,179 persons. Renfrew is also a considerable town near the same: this navigation commences in the *Clyde* river, near Inchinnan, and terminates at the town of Paisley, at which place it was proposed, in 1803, to be joined by the *Glasgow and Saltcoats* canal.

CHELMER AND BLACKWATER NAVIGATION. Acts 6 and 33 Geo. III.—The general direction of this navigation is nearly west for 13½ miles in the county of Essex; its general objects are the supply of Chelmsford and its neighbourhood with coals, deals, &c. and the export of farm produce. It commences in the Tide-way, at Collier's-Reach, in the estuary of Blackwater river, and proceeds by the course of the Chelmer river to the basin at Chelmsford town, with a cut near ¼ of a mile to Malden. Chelmsford and Malden are considerable towns. From low-water in the basin at Collier's reach to Heybridge-mill, on Blackwater river, 1½ mile, is a rise of 12 feet 8½ inches, thence to Becly or Baily-mill, on Chelmer river, 1½ mile, is a rise of 7 feet 3½ inches; thence to the basin at Chelmsford is 10½ miles, with a rise of 59 feet 5 inches: the branch has a rise 6 feet 8½ inches into the basin at Malden. Mr. *John Smeaton* surveyed this line in 1762, and recommended 13 miles of new canal, and estimated the same at near 16,700l.; Mr. *John Rennie* was afterwards employed. The basin at Collier's reach was opened for ships in February 1796; the company were authorized to raise 60,000l. the amount of shares 100l. each; in 1802 these were so depreciated, that they were said not to be worth 5l. each. The spring-tides flow 5 feet at Baily-mill-tail, and 8 feet at Malden bridge; the neap tides do not raise the water above one foot at the last place.

Cheltenham and Tewksbury. In 1801, notices were given for a proposed canal from the *Severn* river, near the junction of the *Avon* therewith, at the town of Tewksbury, to the town of Cheltenham, through the parishes of Tewksbury, Tredington, Elmstone-Hardwick, Uckington, Swindon, and Cheltenham, a course nearly south-east for about 8 miles, in the county of Gloucester. Tewksbury and Cheltenham are considerable places.

CHESTER CANAL. Acts 11 and 17 Geo. III.—The general direction of this canal is about south-east for 18 miles, in the county of Chester; it is not greatly elevated above the level of the sea; its principal objects are the export of farming produce, and the import of coals and lime for Nantwich town, and the surrounding country; it forms a double

communication between two points in the line of the *Ellesmere* canal, at Chester and at Franckton common. Chester is the 25th British town, with a population of 15,052 persons. Nantwich is also a considerable town. This canal commences in the tide-way in the *Dee* river, in the town of Chester, near to where the *Ellesmere* canal crosses the same, and terminates at the town of Nantwich; at Stoke, in the parish of Acton, it is joined by the Whitechurch branch of the *Ellesmere* canal; from Chester to Barbridge, near Tiverton, the distance is 14¾ miles, with a rise of 170 feet 10 inches, and thence to Nantwich it is 3¼ miles, and level. The canal passes Christleton, Waverton, Hargrave, Huxley, Brasseley-green, Beerton-castle, Tiverton, Hurlston, Acton, and Nantwich; there is an aqueduct at Huxley-mill. Mr. *James Brindley*, and other engineers, were employed in 1767, 1769, and 1770; in 1769 an unsuccessful attempt was made to obtain an act for it; it was begun in 1772, and was completed from the *Dee* to Huxley-mill 16th June 1775, and shortly after to Nantwich; a branch was provided for in the act, from Barbridge, 8½ miles long, with a fall of 40 feet, to Middlewich, near to the *Trent and Mersey* canal, but not into it. Although this branch, intended for bringing salt to Chester, was not executed, the expences amounted to 80,000l. and the shares became perhaps the most depreciated of any concern in the kingdom, being sold at one time, as we are informed, for one per cent. of their original value. In 1793, a junction was proposed near Nantwich, with a branch of the intended *Sandbach* canal; in 1793, a rival scheme to the *Ellesmere*, called the Eastern Grand Trunk, was proposed to join at Crows-nest; and in June 1796 the *Commercial* canal was proposed to join at the same place, in order to form by means of the *Asby-de-la-Zouch* canal, and others, a communication for 40 ton boats, between Liverpool, Chester, Hull, London, &c.

CHESTERFIELD CANAL. Act 10 Geo. III.—The general direction of this canal is nearly south-west, by a crooked course 46 miles in length, in the counties of Nottingham, York, and Derby; the western end is considerably elevated; its principal objects are the export of coals from near Chesterfield, and lead from the Derbyshire mines, and the import of lime, corn, timber, &c. Chesterfield, Workfop, and Retford are considerable towns upon this line, which commences in the *Trent* river, near its junction with the *Idle* river, at Stockwith, and terminates at Chesterfield town; from the *Trent* to Workfop the distance is 24 miles, with a rise of 250 feet; thence to Norwood it is 9 miles, with a rise of 85 feet; and thence to Chesterfield it is 13 miles, with a fall of 45 feet: the number of locks is 65; the lower part of the canal, from the *Trent* to Retford, is for large boats of 50 or 60 tons burthen; above this the width is 26 to 28 feet, and depth of water from 4 to 5 feet; the boats here used being 70 feet long and 7 wide, and carrying 20 to 22 tons each. In 1794 such boats as these cost, when new, 90 to 100l. each. The boat-owners here usually pay their bargemen by the ton of goods which they convey stated distances, instead of weekly wages. At Norwood is a tunnel through Hartshill of 2850 yards in length, being 12 feet high and 9¼ wide within-side the arch, and 36 feet below the surface of the hill; this tunnel was begun in November 1771, and finished the 9th May 1775; at Drake's-hole is another tunnel of 153 yards in length. Mr. *James Brindley* projected this canal, and directed its execution until his death in September 1772, when his brother-in-law, Mr. *Henshall*, succeeded, and completed the whole in 1776. The tonnage is 1½d. per ton per mile, and in calculating the same ⅓th of a mile is taken into account, and ¼th of a ton. It appears that the canal cost 160,000l. and the shares were at first much depreciated, and sold for a long time

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time below par; in September last (1805) the profits amounted to 61. per cent. annually. In Mr. *Brindley's* time, a junction was intended at *Chesterfield* with the proposed *Chesterfield and Swarkestone* canal; and in 1802, an extension of this canal was proposed of 5 or 6 miles in length, nearly south to Ashover.

Chesterfield and Swarkestone. The late Mr. *Brindley*, about the year 1771, proposed a canal from the *Trent and Mersey* canal at *Swarkestone* to the *Chesterfield* canal at the latter place, the direct distance being about 25 miles nearly north, the line being through a country very rich in coals. *Derby*, the 43d town, with 10,832 inhabitants, was to be in the line of this canal, and the town of *Belper* is also near it.

CHICHESTER HAVEN. This inlet of the sea, on the coast of *Hampshire*, is of considerable length, in different branches, navigable for ships, surrounding *Thorney Isle*, and connecting with *Langstone* and *Portsmouth* harbours. *Havant* and *Chichester* are considerable towns near it. In September 1805, notices were given for cutting a short canal, to commence with a sea-lock in deep water in this haven, and proceed to *Upper Southgate field*, in *Chichester*, there to terminate in a spacious basin or dock.

CLEBY RIVER. This river has nearly a north-east course, in the county of *Pembroke*, in *South Wales*. It commences in the tide-way in *Milford Haven*, and terminates at *Cannister bridge*, near *Narberth*, which is a considerable town; and *Pembroke* on another branch of the haven is also a considerable place.

CLYDE RIVER. Acts 34 Geo. II. and 9 and 11 of Geo. III.—This river or frith commences with a most noble and capacious estuary, in the northern or Irish channel, and extends nearly north, to *Gonrook*, when its direction changes towards the east, and its width diminishes gradually to *Glasgow*, where the navigation terminates. *Glasgow* is the 5th town in Britain, in point of population, containing 77,385 inhabitants: *Paisley*, in the vicinity of this river, is the 15th town, with 31,179 persons; *Greenock*, the 20th, with 17,458 persons; and *Rothsay*, (on the *Isle of Bute*) the 118th, with 5,281 persons: *Rutherglen*, *Renfrew*, *Dumbarton*, *Port-Glasgow*, *Irvine*, and *Ayr*, are also considerable places on or near the banks of this river. At *Glasgow* basin a branch of the grand *Forth and Clyde* canal joins this, as also the *Monkland* canal, and *Edinburgh and Glasgow* canal; near *Inchinnan* the *Cart* river joins, and at *Dalmure Burnfoot*; the western termination of the *Forth and Clyde* canal is in this river; while the navigable lochs and sounds which connect therewith below *Dumbarton* are both numerous and important; by means of lochs, *Fine*, and *Gilp*, there is a connection with the *Crinan* canal. In the year 1805 an act (45 Geo. III.) was obtained by the earl of *Eglington* and others, for building new piers and improving *Ardrossan* harbour, and building wet-docks, &c. near *Saltcoats*, on this river, and in this harbour, as well as at *Glasgow*, the *Glasgow and Saltcoats* canal was, in 1803, proposed to connect therewith; at *Rothsay*, on the *Isle of Bute*, piers have been built, and the harbour connecting with this river improved; *Greenock* harbour is also under great improvement, in consequence of an act of 43 Geo. III. The trade on this river is very immense and various; it appears that *Greenock* alone employed 175,551 tons of shipping thereon in the year 1800.

CODBECK BROOK. Act 7, Geo. III.—The direction of this navigation is nearly north for about six miles, in the north riding of *Yorkshire*, commencing in the *Swale* river near *Topcliff*, and extending to the town of *Thirsk*, for whose accommodation it is intended.

COLNE RIVER. The general direction of this navigation

is nearly N.W. for about 8 miles, in the county of *Essex*; its objects are the import of coals, deals, &c. and the export of farm produce, and of oysters from the banks below *Wivenhoe*. *Colchester* is the 39th place in Britain, with a population of 11,520 persons. It commences with an estuary at *Mersey island*, and terminates at the town of *Colchester*, to which place small sea-built vessels can get up. Large ships navigate to *Wivenhoe*, where there is a dock-yard for building frigates and large trading ships.

ST. COLUMB CANAL. The general direction of this canal is nearly east for seven or eight miles, in the county of *Cornwall*; although near the coast, it is considerably elevated. Its objects are the export of a particular species of stone found about *St. Dennis*, called *China-stone*, used in great quantities in *Wedgewood's*, and other potteries near the line of the *Trent and Mersey* canal, and the import of coals, and of a sea-sand consisting of broken shells for manure. This canal was proposed to proceed across the western branch of the grand ridge to the south coast; not one third of which length has, however, been carried into effect. *St. Columb Major*, *St. Austel*, and *Grampound*, are towns near the line. It commences at the sea-shore of the Irish channel near *St. Columb Minor*, and terminates at present within about two miles of *St. Columb Major*; from thence it was to pass *St. Dennis*, *St. Stephen*, *St. Ewe*, and arrive at the sea again near *Pentuan*, not far from the famous *Polgarth* mines and engines. The part which was completed about the year 1775, commenced on the top of a very high cliff, and pursued the course above mentioned, without locks, we believe. The canal was a narrow one, and at its west end, the cliff was with great labour hewn down, into a steep inclined plane, that was covered with planks: the canal was conducted to the very top of this plane, and the boats which were rectangular ones, were brought, when loaded with stone, to the termination of the canal, where they were fastened by a sort of hinges; strong ropes were then attached to the stern of the boat, and by means of a wheel and drum, worked by a horse-gin or wem; the boat was hauled up an end, and the stones were thereby shot out, and rolled down the plane to the strand below, from whence boats conveyed them on board the ships. The same wheel and drum was adopted for drawing boxes of coals or Shelly sand up the plane, in order to their being loaded into the returning boats. Near to its eastern termination the canal was conveyed on an aqueduct bridge over a road. We have been favoured with these particulars by a Cornish gentleman, since our account of inclined planes was written, or we should have noticed this (the plane on *Parnel's* canal and another on the *Calder and Hebble*) as early instances of the use of inclined planes for boxes of goods, &c. For seven or eight years this canal continued in use, but whether like the *Mawgan* canal, in its neighbourhood, it has since been disused, we are not at the present moment able to learn.

Commercial Canal. In the year 1796, Mr. *Robert Whitworth* was employed to survey this line, proceeding from the *Chester* canal at *Nantwich* to the *Askby de-la-Zouch* canal near that town; it was proposed to join Sir *Nigel Grisley's* canal and the *Newcastle under-line* canal, to cross the *Trent and Mersey* canal near *Burslem*, and proceeding by *Uttoxeter*, to cross the *Trent and Mersey* canal again, and the *Trent* river at *Burton*. The objects of this proposed canal were, the forming of a communication for larger boats (40 tons) than the *Trent and Mersey* is calculated for, except below *Burton*, and contributing towards the wished-for passage of large boats between *Liverpool*, *Manchester*, *Chester*, *Hull*, *London*, &c.

CONWAY RIVER. This river has nearly a south course for

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14 or 15 miles, between the counties of Caernarvon and Denbigh in North Wales; its principal object seems to be the supply of Llanrwst and Aberconwy, which are considerable towns. It commences at the tide-way in Conway bay, and terminates at Llanrwst town. In June 1802, it was in contemplation to straighten the course of this river, about a mile below Llanrwst, by a new cut 492 feet long, 88 feet broad at top, and 60 at bottom, with a dam at its upper end across the old crooked channel. At Llanrwst, there is a curious stone bridge of three arches, built by *Inigo Jones*, over this river; and in 1802, it was proposed to construct a stupendous cast iron bridge over it at Aberconway ferry, in order to facilitate the communication with Ireland by way of Holyhead, in the Isle of Anglesea; another iron bridge being intended at Bangor ferry, on *Menai* strait.

COOMBE-HILL CANAL. Act 32 Geo. III.—The course of this canal is nearly S. E. for $3\frac{1}{2}$ miles, in the county of Gloucester: its general objects are the export of coals from the mines near it, and shortening of the length of land carriage to Cheltenham, which is a considerable town; and so is Tewksbury near its western end. It commences in the *Severn* river at Fletcher's leap in Dearthurst, and terminates at Combe hill in the parish of Leigh, the rise being 15 feet only. This canal was constructed at the sole expence of three persons, viz. *Thomas Burges*, *William Miller*, and *Sarah Mumford*.

Cottingham and Hull. In the year 1802, this line of canal was proposed, about four or five miles in length, in a N.W. direction, in the east riding of Yorkshire, to commence in the *Humber* river at the town of Hull, and extend to the town of Cottingham. The import of coals, deals, &c. and the export of farm produce, and perhaps of chalk, seem to be its principal objects. Hull is the 16th town in Britain, with a population of 29,516 persons.

COVENTRY CANAL. Acts 8, 25, (for *Trent and Mersey*) and 26 of Geo. III.—The general direction of this canal is nearly S.E. for about 22 miles (exclusive of the detached part beyond the *Birmingham and Fazely* canal, and the branch to Coventry) in Staffordshire and Warwickshire. Its situation is high, particularly the eastern part, which crosses the grand ridge near Bedworth, without a tunnel, and its Seefwood branch does the same. Its general objects are the line of communication between London, Birmingham, Manchester, Liverpool, &c. the export of coals from the numerous mines near it, and the supply of Coventry city, which is the 24th on the list of British population, with 16,034 inhabitants. Nuneaton, Atherstone, and Tanworth, are also considerable towns near the line; and Hinckley, the 120th, with 5,070 inhabitants, is also in its vicinity. It commences in the *Birmingham and Fazely* canal at Fazely, and terminates in the *Oxford* canal at Longford; its detached part of $5\frac{1}{2}$ miles in length, commences at the termination of the *Birmingham and Fazely* canal at Whittington brook, and terminates in the *Trent and Mersey* canal at Fradley heath; near to Whittington brook, it connects with the *Wyrley and Essington* canal, and at Marston bridge the line is joined by the *Ashby de-la-Zouch* canal. There is a cut of about one mile in length to Griff collieries, belonging to sir Roger Newdigate; another to several collieries by different branches near Seefwood-pool and Bedworth, five or six miles in length; there is also a cut of half-a-mile from the line to Bedworth; the branch to Coventry is $4\frac{3}{4}$ miles in length, and there is a rail-way branch to Oldbury coal works. The detached part is level with the *Trent and Mersey* canal, which level continues (through $5\frac{1}{2}$ miles of the *Birmingham and Fazely*) to the commencement of the line of this canal at Fazely; from thence to Atherstone, a distance of about

10 miles, the rise is 96 feet, by means of 13 locks; from thence to the *Oxford* canal, about 12 miles, is level; so is the cut to Coventry, and those to Griff, Seefwood-pool, Bedworth, &c. The last or highest level of this canal forms, with part of the *Oxford* and *Ashby* canals, the longest level that is to be found in Britain, being upwards of 82 miles, we believe, including side branches. This is a narrow canal, but the company have bound themselves to widen the fame to the width of the *Grand Junction*, if the proprietors of that canal shall at any future time require it. A stop-gate is maintained at the end of the *Oxford* canal at Longford, to prevent this canal, which is sometimes low in Summer, from drawing off their water. Mr. *James Brindley* was the original engineer to this concern, and $16\frac{3}{4}$ miles of the level part from Coventry to Atherstone was completed in 1786, when the works were suspended for near 10 years; at length, the *Trent and Mersey* company undertook to complete 11 miles of this original line north of Fazely; half of which they afterwards sold to the *Birmingham and Fazely* company; and the other half, on the 4th of February, 1787, was purchased by this company, who thus came to have a detached part of their canal. The line of communication was opened by the completion of this canal in June 1790. This company have been authorized to raise 120,000l., their shares being 100l. each. Some years after the completion of this and the *Oxford* canal, the shares herein had obtained the great price of 400l., but owing to the rivalry of the *Warwick and Napton* canal, they were, in 1802, reduced to 350l., and their dividend to 8l. per cent. Since the completion of the *Grand Junction*, this concern has been flourishing, and the dividends are now 16l. per annum per share. The tonnage allowed on this canal is $\frac{1}{2}$ d. per ton per mile for lime and lime-stone, and $1\frac{1}{2}$ d. per ton per mile for all other articles, (except road or paving materials and manures upon the pounds, or when the water runs to waste at the locks.) On the completion of the adjoining canals, the tonnage on coals was, by their general consent, reduced to 1d per ton per mile upon several of them. It was agreed, between this and the *Oxford* company, (9 Geo. III. *Oxford*) that the latter should be entitled to all tolls, except on coals, that are collected on the first $3\frac{1}{2}$ miles of this canal towards Coventry, for goods passing from the *Oxford* canal, and that this company should in return receive the tolls upon coals collected on the first 2 miles of that canal. The act of 34 Geo. III. for *Ashby de-la-Zouch* canal, granted to this company 5d. per ton upon all goods (except farming produce, manures, or road materials, or iron or its ore, made or dug on the banks of the *Ashby* canal) navigated thereon, which shall, either before or after, pass on any part of this canal, or the *Oxford* or *Grand Junction*; and a farther sum per ton, equal to the tonnage hereon between Griff and Longford, on all goods which may pass any new communication that may hereafter be opened between the *Ashby* canal and the *Oxford* or *Grand Junction*; for enforcing which, this company is empowered to erect toll-houses and stop-bars, and place collectors on any part of the *Ashby* canal.

CREE RIVER. The course of this river is nearly north, for 9 or 10 miles of a crooked course, between the counties of Wigton and Kirkcudbright in Scotland; its object is the supply of the adjoining country, and of Wigton, which is a considerable town. It commences in the tide-way in Wigton bay in the Irish or Northern Channel, and terminates at Newton Douglas.

CRINAN CANAL. Acts 33, 39, and 45 of Geo. III.—The course of this very wide and deep canal is nearly west for about nine miles, in the county of Argyle in Scotland; its sole object is the shortening of the passage for ships between

tween the Irish Sea and the *Clyde* river (by means of the loch of Pine), by avoiding the voyage round the peninsula of Kintire. It commences at loch Gilp, and terminates in loch Crinan. The rise is 58 feet, and the fall 59 feet, a rivulet near the point of division serving as its feeder. The water in this canal is 12 to 15 feet deep. This line of canal was first surveyed for smaller vessels by Mr. *Watt*, after which Mr. *John Rennie* was employed herein; it appears to have been opened some time, but farther improvements, and the building of a pier in Loch Gilp are yet in hand. The proprietors have been authorised to raise 180,000*l.*, and they have also received 50,000*l.* of the public money, which parliament granted in aid of this great and important work. The shares are 50*l.* each. A vessel under sail, not being stopped in proper time, before she arrived at a lock on this canal, bore the same away, and went down therewith into the next pound. A passage may, it is said, be made by means of this canal in three or four days, which frequently took up three weeks. In 1802 the shares herein were 22*l.* below par.

CROMFORD CANAL. A& Geo. III.—The general direction of this canal is about N.W. for 18 miles, in the counties of Nottingham and Derby; it is considerably elevated: its general objects are the export of coals and of lead, iron, lime-stone, and other minerals from the mines of Derbyshire. Wirksworth and Belper are considerable towns near its course. It commences in the *Erewash* canal at Langley bridge (not far from the junction of *Nottingham* canal therewith), and terminates in the town of Cromford near Matlock. There is a cut to Pinxton coal works of three miles in length, another to Swanwick coal works; also a rail-way branches to Critch lime-works, $1\frac{1}{2}$ mile, and to Biggarlee coal works $1\frac{1}{2}$ mile. From the *Erewash* canal to near Codnor castle, four miles, there is a rise of 80 feet, thence to Cromford, 14 miles, it is level; the Pinxton branch is level, and proceeds from the upper level. The width of this canal at top is 26 feet; the boats are 80 feet long, $7\frac{1}{6}$ feet wide, and $3\frac{1}{3}$ feet deep; when empty they draw 8 or 9 inches of water, and when loaded with 22 tons, they draw about $2\frac{1}{2}$ feet. Near Ripley is a tunnel of 2966 yards in length, which is 9 feet wide within at the water's surface, and 8 feet high from thence to the crown of the arch, which is of brick, except some parts where the rock proved hard and found enough to stand without walling: the side-walls and crown of this arch seem to be part of an ellipsis, but where an inverted or bottom arch was wanted, the same is much flatter. For constructing this tunnel, 33 pits or tunnel-shafts were sunk, some of them on the summit of the hill, being 57 yards deep. This tunnel is said to have cost 7*l.* per yard in length: it intersects a valuable seam of coals, which is now worked, and in sinking the tunnel-pits excellent iron ore was found, which is now worked, and the furnaces are supplied with coals drawn up through a shaft from below for that purpose. There are several smaller tunnels upon the line for shortening its course. Near Butterly hall there is a considerable deep-cutting, and shorter ones in other places, to avoid the loops round the points of the hills. Over the Derwent river, near Wigwell, there is a large aqueduct bridge 200 yards long and 30 feet high, the river arch is 80 feet span. Two smaller arches by its side serve to carry off floods, and for a road. Over a small river, which comes into the Derwent near Frithly, is another large aqueduct bridge about 200 yards long and 50 feet high; besides the river arch, there are two others, one for floods, and another conveys the turn-pike road under the canal; these two aqueducts are said to have cost about 6000*l.* There are considerable embankments in some places on this canal. Nearly

over the Ripley tunnel there is a reservoir of 50 acres of water when full, the head or embankment of which is 200 yards long, 33 feet in height in the middle of the valley, the base being there 52 yards wide, the top of the bank is four yards wide. This reservoir is said to have cost 1600*l.*; the mean depth of it is 12 feet, and it will contain about 2800 locks full of water, which is let out by a large pipe and cock in one of the tunnel-pits. There are two other reservoirs for this canal, one of 20, the other of 15 acres. At the Cromford end of the canal there is a considerable stream of water taken in as a feeder, and the whole of the 14 miles of level and branches thereto have their banks made up one foot higher than usual to act as a reserve for dry weather. Mr. *William Jessop* was the engineer to this canal, and it was completed before the year 1794. The total cost is said to have exceeded 80,000*l.* For the cutting and wheeling of clay, $3\frac{1}{2}$ d. per cubic yard, per stage of 20 yards, was usually paid; for gravel $4\frac{1}{2}$ d. per yard; for stony ground $4\frac{1}{2}$ d. per yard, and 4d. per cubic yard extra for all stones picked out and stacked. In the year 1797, a cut was proposed from the summit-level to the new collieries in Codnor park. In 1801, notices were given for the intended *Belper* canal, that was proposed to join this near to Bull bridge; and in 1802, a cut was proposed to be made from the Derwent aqueduct on this canal to near Dethick, and thence near the Derwent and Wye rivers to the town of Bake-well.

CROUCH RIVER. The course of this river is nearly west, in the county of Essex. The principal objects of this navigation are the import of coals, deals, &c. and the export of farm produce, and of oysters from near Walfleet. Bilerica and Rochford are the nearest considerable towns to this river. It commences in the English channel (about 10 miles from the mouth of the *Thames*), and terminates at Hull bridge.

CROYDON CANAL. A& 41 Geo. III.—The general direction of this canal is nearly south for $9\frac{1}{2}$ miles, in the counties of Kent and Surrey: it is not greatly elevated; its objects are the supply of Croydon with coals, deals, &c. and the country through which it passes with manures and other articles, and the conveyance of its produce to the London markets, and the export of fire-stone, flint, and fullers' earth. Croydon is the 108th British town, with a population of 5,743 persons. Deptford is also a considerable place. This canal commences in the *Grand Surry* canal near Deptford (two miles from its connection with the *Thames* at Rotherhithe), and terminates at the new Bafon near the town of Croydon. From the *Grand Surry* canal (level with an ordinary high tide in the *Thames*) to the top of Plowgarlick hill, $1\frac{1}{2}$ mile, is a rise of 70 feet, by 12 locks; thence for $\frac{1}{2}$ a mile it is level, and thence for $\frac{3}{4}$ of a mile to the beginning of Forest wood, there is a rise of $79\frac{1}{2}$ feet, by 13 single and one double locks; from thence to Croydon, 7 miles, it is level. The locks upon this canal are 60 feet long and 9 feet wide; each lock has a groove for stop-planks at its head, but no paddle weirs; the waste water is intended to run over the upper gates. This company are to have a bafon for their boats to lie in at Rotherhithe, on the fourth-east side of the *Grand Surry* entrance bafon, and another by the high road near Croydon town. There are seven road bridges and 30 accommodation swing-bridges. On the top and northern slope of Plowgarlick hill, there is a considerable deep-cutting, and others in Sydenham and on Penge common; and near Selhurst wood is a considerable embankment. On Sydenham common there is a reservoir of 10 or 15 acres supplied in wet times by a feeder out of an adjoining vale, and into which its waste or over-fall is to be when full; there is another

another reservoir on Norwood common, which, with the long summit-pound on so tenacious a soil, will be sufficient, it is presumed, to supply the locks that are making. At the time the act passed for this canal, it seemed intended to use inclined planes, and to pump the water for supplying the pounds up from the *Grand Surry* canal by steam-engines, that were also intended to wind the boats up the planes: and it seems singular, under these circumstances, that legislative provision was made, for a culvert or small tunnel through Forest-hill for conveying water from the summit-level of this canal on Sydenham common, and by aqueducts or pipes to supply several towns and places with water, viz. by a branch of near $\frac{3}{4}$ of a mile to the top of Dulwich town, and from the end of the said tunnel to Knight's hill by a crooked course of three miles in length through Norwood, and along Knight's hill towards London for one mile; also another branch of near one mile to Streatham town. Mr. *John Rennie* and Mr. *Ralph Dodd* were the engineers, and Mr. *Clark* is now employed as resident engineer thereon. About seven miles of the upper end of this canal is completed and in use, and the remainder is proceeding with great expedition. The company are empowered to raise 80,000*l.*, which is not now expected to prove sufficient; the amount of shares are 100*l.* each. The sum of 40*l.* is to be paid annually to the city of London, towards improving the Thames river above London Bridge. This canal is to have its water kept always two feet above the surface of the ground on Croydon common, and some other severe and unprecedented restrictions are introduced in favour of the millers on the Wandle river, at some miles distance.

Croydon and Wandsworth. In September 1800, proposals were made for a canal from the river *Thames* at Wandsworth, following nearly the course of the Wandle river to Croydon in Surry; but the same was given up shortly after, in favour of the north *Surry* iron rail-way, which passes through nearly the same tract.

CYFARTHFA CANAL. The general direction of this canal, or *water level*, is nearly N.W. we believe, for about 3 miles, in the county of Brecknock; it is on a high level, and was constructed some years ago by Mr. *Bacon*, to bring coals and iron-ore from the mines in the mountains, to his furnaces at Cyfarthfa, near Merthyr Tidvil. The whole is upon one level, and it does not connect with any other canal or navigation; it is now the property of Mr. *Crawshaw*, the great iron-master. It is situate near to the northern ends of the *Glamorgan* canal and the *Cardiff and Merthyr* rail-way.

DARENT RIVER. The course of this river (called Dartford creek,) is south for near 3 miles in the county of Kent; it commences in the tide-way in the river *Thames*, and terminates near the town of Dartford, for whose supply it is principally used.

DART RIVER. The general direction of this river is nearly N.W. for about 10 miles, in Devonshire; the tide flows through its whole length; its principal objects seem to be the supply of Totness with coals, and the country with shell-sand manure, and the export of farming produce. Dartmouth and Totness are considerable towns; its commencement is in Start bay, and it terminates at the Mill weir, about one mile above Totness; this river is plentifully stored with trout.

Dean-Forest Rail-way. In the year 1802, it was proposed to construct a rail-way from the river *Wye*, near to English Bichnor, we believe, to the summit of the Forest of Dean, its object being the carriage of the immense stores of coal and iron, with which it abounds; Colford is a considerable town near its route. In the preceding year the *Severn and Wye* rail-way was proposed to pass nearly the same track.

DEAN RIVER. Act 12 Geo. III.—The direction of this

river is nearly S. for about 2 miles, in the county of Nottingham; it is not greatly elevated above the level of the sea; its principal object is the supply of Newark, the 91st town in the list of British population, with 6730 inhabitants. It commences in the river *Trent*, at Crankley's, in South Markham, and terminates at the upper weir near the town of Newark; the works hereon were completed in Jan. 1797. In 1793 the *Newark and Battersford* was proposed to join this at Newark.

DEARNE AND DOVE CANAL. Acts 33 and 40 Geo. III.—The general direction of this canal is about N.W. for $9\frac{1}{4}$ miles, in the West Riding of Yorkshire, its northern end is considerably elevated; its objects are the communication between Sheffield, Wakefield, Halifax, Leeds, Manchester, Liverpool, &c. and the export of the coals and iron-stone, &c. so plentifully found on its course. Barnsley and Rotherham are considerable towns on or near it, so is Doncaster, the 110th town, with 5697 inhabitants. It commences in a side cut of the *Don*, or *Dun* river, between Swinton and Mexburgh, and terminates in the *Barnsley* canal at Eyming's wood, near Barnsley, there is a branch of $3\frac{1}{2}$ miles to Rockcliff bridge, and another of $1\frac{1}{4}$ miles to Cobcar Ing. From the cut of the *Don* navigation to Knoll Brook the distance is $4\frac{1}{4}$ miles, with a rise of $41\frac{1}{4}$ feet; thence to Aldham Mill, $2\frac{1}{2}$ miles, is a rise of 24 feet, (the Cobcar Ing branch being on its highest level); thence to the *Barnsley* canal is $2\frac{1}{2}$ miles, with a rise of $59\frac{1}{2}$ feet; the Cobcar Ing branch is level; the Rockcliff branch begins from the summit-level, and $1\frac{1}{2}$ mile to Workborough bridge is level; thence to Rockcliff bridge, $1\frac{1}{2}$ mile, it has a rise of 56 feet. The locks on this canal are built with excellent hewn or ashler stone, and are calculated for boats of 50 or 60 tons burthen, the same as navigate the *Dun* river, and this company are required to keep a depth of water equal to $4\frac{1}{2}$ feet on their lock-fills, and in every part of their line; and for guarding against loss of water on the summit, a stop-gate is to be erected hereon, near the termination in the *Barnsley* canal, and another on that canal below the junction, both of which may be shut and locked when the supply of either canal fails, and it would consume the water of the other. The aqueduct and other bridges hereon are substantially constructed of hewn stone. Tumbling-bays and gauge-weirs are to be erected for supplying several mills. There is a large reservoir near Elfsicar. Proprietors of mines may make rail-ways to this canal, if within 1000 yards, or 2000 yards near Wath. Mr. *John Thompson* is said to have been the engineer, and it was completed in the year 1804. The company were empowered to raise 100,000*l.* The amount of shares 100*l.* each. The rates of tonnage on this canal are too various and complicate for the room we can allot to this subject, they will be found in *Phillips' 4to. History*, p. 62 to 66; but it must be observed, that the last act (40 Geo. III.) made an increase of, we believe, 50 per cent. on these tolls. Boats are to pay for 6 miles of tonnage, however short a distance they may have navigated on this canal. In May 1797, earl Fitzwilliam proposed, at his own expence, to extend the Cobcar Ing branch to his Elfsicar collieries, on being allowed water for the same from the Elfsicar reservoir.

DEBEN RIVER. The course of this river is nearly N.W. for about 10 miles, in the county of Suffolk; its objects are the imports of coals, deals, &c. and exports of farm produce; it commences at the sea near Felixtow, and terminates near Woodbridge, which is a considerable town.

DEE RIVER, (Aberdeen). This river takes its course about west for 2 miles, between Aberdeenshire and Mearns county in Scotland, the tide flowing through the whole navigable length; it commences in the harbour of new Aberdeen,

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where it is joined by the *Aberdeenshire* canal. New Aberdeen is the 19th town in Britain, with 17,597 inhabitants, and its harbour was improved by a pier of 300 yards in length, begun under the direction of Mr. *John Smeaton*, in 1770, who was employed again in 1778, to make farther improvements. In 1801, Mr. *Thomas Telford* was employed to design new works and improvements hereon, so that ships of 18 or 20 feet draught of water may be accommodated. There are excellent granite quarries near this river.

DEE RIVER, (*Chester*). The general course of this river is nearly S.E. for about 22 miles, in the county of Flint, and skirting the county of Chester: the first 9 miles are by a wide estuary opening to the Irish channel, and from near the town of Flint thereon, a new cut was made for the river up to Chester, under the direction of Mr. *Nathaniel Kinderley*, about the year 1749; before which time the old channel was so choked with sand, that ships of burthen could not come within 7 or 8 miles of Chester; the new straight cut, that was at first 8 feet deep in general, principally through marshes, soon scoured itself out, so that ships of 200 tons could come up to the town, and where the time of high-water became earlier by $\frac{2}{3}$ of an hour, than when the tide had to make its way through the old crooked and shallow channel. Chester is the 25th town, with 15,052 inhabitants, Holywell near it, is the 111th, with 5,567 persons, and Flint is also a considerable town. On the N.W. side of Chester the *Ellesmere* canal connects with this navigation and crosses it, for which goods pay 2d. per ton to this company; it is also to receive from the *Ellesmere* company whatever its tolls may fall short of 210l. annually. At Chester this river is joined by the *Chester* canal.

DEE RIVER, (*Kirkcudbright*). The course of this river is nearly N. for about 6 miles, in the county of Kirkcudbright in Scotland, being an estuary opening to the Irish sea. Kirkcudbright is a considerable town thereon, and where the *Glenkens* canal connects therewith.

DERBY CANAL. Act 33 Geo. III.—This canal runs nearly N. for about 9 miles, in the county of Derby; it is not greatly elevated above the level of the sea. Its objects are, the supply of the town of Derby, and the export of coals and iron. Derby is the 43d British town, with a population of 10,832 persons. It commences in the *Trent* river at Swarkestone bridge, crosses and intersects with the *Trent and Mersey* canal, and terminates at Little Eaton, near 4 miles above Derby, from which town a cut of $8\frac{1}{2}$ miles goes off to a place between Sandiacre and Long Eaton, and there joins the *Erewash* canal. There is a rail-way branch of $4\frac{1}{2}$ miles, to Smithy-houses near Derby, another to Horsley collieries, and another of $1\frac{1}{2}$ mile to Smalley mills. In case a rail-way, or canal, should be hereafter made S. of the *Trent* from Bredon lime-works, this company has engaged to make a cut between the *Trent and Mersey* canal and the *Trent*, at Weston cliff, opposite thereto. From the *Trent* to the *Trent and Mersey*, $\frac{1}{2}$ a mile, is a rise of — feet; thence to Derby, $5\frac{1}{4}$ miles, is a rise of 12 feet; and thence to Little Eaton, $3\frac{1}{4}$ miles, is a rise of 17 feet; the *Erewash* branch has a fall of 29 feet. This canal is 44 feet wide at top, 24 at bottom, and 5 feet deep, except the upper level next Little Eaton, which is made 6 feet deep to retain the water of wet seasons like a reservoir; the locks are 90 feet long, and 15 feet wide within side: adjoining the town of Derby is a prodigious large weir or tumbling bay, where the canal crosses the *Derwent* river, that was navigable to this place for many years back, but the tolls thereof were expected to fall off on the completion of this canal, and it was therefore agreed, that this company should purchase the whole concern for 3996l. A little W. of the river

above-mentioned, the canal crosses a brook in a cast-iron trough or aqueduct. This canal was finished in 1794; the company were authorized to borrow 90,000l. the value of shares being 100l. Separate rates of tonnage were fixed on different goods, between the *Trent* and the *Trent and Mersey*, between that and Derby, and on the different cuts and rail-way branches, which are too long for us to insert, they will be found in *Phillips' 4to. History of Canals, Appendix*, p. 55 to 59. Manures are to pass toll-free, and punchcons or clogs of wood, to be used as supports in the adjacent coal-mines, also road materials, except for turnpike-roads; and if the Mansfield turnpike-road tolls are reduced below 4 per cent. on their debt, this company is to make them up to that sum. The profits of this concern are not to exceed 8 per cent. but after 4000l. is accumulated as a stock for contingencies, the tolls are to be reduced. Five thousand tons of coals annually are to pass hereon toll-free, for the supply of the poor of the town of Derby. Horses pay 1d. and cattle $\frac{1}{2}$ d. each, for liberty of passing along each rail-way branch.

DERWENT RIVER, (*Derby*). The course of this river is nearly N.W. for about 9 or 10 miles, in the county of Derby; its principal object was the supply of Derby, previous to the making of the *Derby* canal, when this concern was sold to that company, as mentioned above. It commenced in the *Trent* river at Wilden-ferry, (where the *Trent and Mersey* canal commences,) and terminated at the town of Derby.

DERWENT RIVER, (*New Malton*). The general course of this river is nearly N. for about 37 miles, in the East Riding of Yorkshire; its objects are the supply of New Malton (a considerable town) with coals, deals, &c. and the export of farm produce, chalk, &c. It is but little elevated above the sea; it commences in the *Ouse* river at Barnby, and terminates at the town of New Malton. In January 1804, it was in contemplation to make this river navigable up to Yedingham bridge.

DERWENT RIVER, (*Workington*). The course of this river is nearly E. in Cumberland. Workington, on its banks, near the Irish sea, is the 109th British town, with 5,716 inhabitants; to the vicinity of this town there are several rail-ways, which bring down coals from Mr. *Curwen's*, and other coal-mines, for exportation from this place.

DEVON RIVER. The general direction of this river is nearly N.E. in Clackmannanshire in Scotland, from near Cambus quay, on the Frith of *Forth* (two and a half miles above Alloa) to Medlockfoot. Mr. *John Smeaton* was, in 1765, and again in 1768, consulted, about making this river navigable, or a canal by its side, the rise being $38\frac{1}{2}$ feet, in order to bring down the produce of several coal-mines near its banks, to be shipped on the *Forth*, wherein the spring tides rise 20 feet at Cambus quay. A branch was proposed to Alloa, and another to Sterling.

DEWSBURY AND BIRSTAL RAIL-WAY. The general direction of this rail-way is nearly N. for about 3 miles, in the West Riding of Yorkshire, and its object is to bring down coals to the vessels in the *Calder* river; it commences in the *Calder and Hebble* navigation at Dewsbury, and terminates at Stubley coal-mines in Birstal parish, which are worked by Messrs. *Thomas Chester* and Sons, who are also the sole proprietors of this iron rail-way, which was completed in the present month (October 1805).

DON, (or *Dun*) RIVER. Act 12 Geo. II. The general direction of this river is nearly S.W. for near 40 miles in the West Riding of Yorkshire, (including what is, in some maps, called the Dutch river, near to the *Ouse*,) the southern end of this navigation is rather elevated. The original objects of.

of this navigation were principally the supply of Sheffield, and the export of the iron-wares and iron from Sheffield, Rotherham, &c. since which period, the *Dearne and Dove* canal, which joins at Swinton, and the *Stainforth and Keadby*, at Fishlake and at Hangman Hill, and the cut to the *Ayre* river near Snaith, have opened new sources of supply, and for the export of coals, stones, iron, and manufactured goods of several kinds, which this rich track of country produces. Sheffield is the 14th British town, with 31,314 inhabitants, Doncaster is the 110th with 5697 persons; Rotherham, Doncaster, Thorne, and Snaith are also considerable towns on or near this navigation. The commencement is in the *Ouse* river, at Goole bridge, and it terminates at Attercliffe, within 2 miles of Sheffield, and has a cut to the *Ayre*, as above, and side-cuts with locks between Mexborough and Swinton, and in other places; the tide flows above the junction of the river Went. The *Stainforth and Keadby*, act 33 Geo. III. has directed rates for boats passing out of this into that canal by the cut of this river. In September 1803, notices were given, for a new act for weirs and side-cuts to this river in Mexborough, Spotborough, and other places, and a new course for the river, near the junction of Dearne river. And, in February 1803, there was a design of extending this navigation to Sheffield by a canal from Tinsley, 4 miles, for which 30,000l. was subscribed.

DONNINGTON-WOOD CANAL. The general direction of this canal is about N. or N.E. for 7 miles in Shropshire; it is upon a very high level, nearly parallel to the grand ridge on the western side: its object is the conveyance of iron-stone and lime-stone, from the mines to the Donnington-wood iron works in Lileshal parish, and lime and coals for the supply of the town of Newport, which is a considerable place. It commences in the *Shropshire* canal (near its junction with *Shrewsbury* canal,) at Donnington wood, and terminates at Pave-lane wharf near Newport; it has a level branch to Lileshal lime-works, but on a higher level than the line, to which the lime-stone was formerly let down, in boxes through perpendicular shafts, at the same time that other empty boxes were ascending, the construction being nearly the same as the shafts afterwards used at Brierly-hill on the *Shropshire* canal, but like them they have since been disused and inclined planes are now used, on which boxes of lime-stone descend and draw up empty boxes by means of ropes passing over a large drum, to which a brake-wheel is adapted to regulate the motion. The boats hereon carry 25 tons of lading: the canal was cut in 1778 at the joint expence of the marquis of *Stafford* and Messrs. John and Thomas Gilberts. In June 1797 this was proposed to be joined at Pave-lane by the *Newport and Stone* canal.

DORSET AND SOMERSET CANAL. Acts 36 and 43 Geo. III.—The general direction of this canal is nearly S. for about 40 miles in the counties of Wilts, Somerset, and Dorset: the middle part of it is on a high level, and crosses the fourth western branch of the grand ridge. Its principal objects are the supply of the manufacturing towns and neighbourhood through which it passes, with coals from the mines bordering on Mendip, and the opening of an inland communication between the Bristol channel, the *Severn*, the *Thames*, and the southern coast of the island. Froome is the 60th town in the order of population, with 8,748 inhabitants, and Bradford, the 78th, with 7,302 persons; Bruton, Wincanton, Stalbridge, and Sturminster are also considerable towns near the line. The commencement is in the *Kennet and Avon* canal at Widbrook near Bradford, and the termination in the *Stour* river near Gains-crofts in Shillingstone-Okeford; from near Froome a branch of about 9 miles proceeds to Nettlebridge collieries in Midsummer-Norton.

The Nettlebridge branch was first cut, in order to supply coals to Froome and its neighbourhood; and water being scarce thereon, one of Mr. *Russell's* balance-locks was erected on a 21 feet fall at Mells near Froome, and was publicly tried on the 6th of September, and 13th of October 1800, and in June 1802, as particularly described in a previous part of this article. An aqueduct bridge was erected several years ago over the river near Froome, but it is with slow pace, we fear, that the works are proceeding towards a final completion. The company were by the first act authorized to raise 225,000l. and a further sum under the second, we believe, the amount of shares being 100l. Stones are to be erected at every half mile: pleasure-boats of 12 feet long and 5 broad may be used on the pounds, 30 yards in width are allowed, in general, for the company to purchase, and 100 yards wide for docks, wharfs, &c. springs may be taken and reservoirs formed any where within 2000 yards of this canal.

DOUGLAS RIVER (Lower Navigation.) Acts 6 Geo. I. and 10 and 23 Geo. III. (for *Leeds and Liverpool*). The course of this navigation is nearly south; for 9 miles in Lancashire it is but little elevated above the sea; its objects are the export of common and cannel coals, and farm produce, and the import of lime-stone; it commences in the tide-way in the estuary of the *Ribble* river near Halketh, and terminates in the *Leeds and Liverpool* canal at Brier's Mill. From the *Ribble* to Solom, about 5 miles, the river Douglas (or Asland) is navigable, and thence to Brier's Mill is a canal 4 miles, with a rise of 8 locks, the whole rise from the *Ribble* being 49 feet. The width of the canal is 24 to 30 feet, and depth of water 5 feet; the locks are 70 feet long, and 15½ feet wide. The first act above authorized Messrs. *William Squires* and *Thomas Steers* to make the *Douglas* river navigable from the *Ribble* to Miry-lane end, near Wigan, which they effected about the year 1727; being allowed 2s. 6d. per ton for goods, whatever distance they might be navigated thereon; by the first act for the *Leeds and Liverpool* canal (10 Geo. III.), their successors were authorized to make a junction with the *Leeds and Liverpool* canal at Newborough by a cut of 3½ miles long, parallel to this river, with a fall of 12 feet, which they completed in 1774, and the same now forms part of the *Leeds and Liverpool* canal, S.E. of Newborough aqueduct bridge, in consequence of the purchase which that company made of the whole of this concern, in pursuance of their act of 23 of Geo. III.; since which, the canal from Brier's Mill to Solom above described, as part of the lower navigation, was cut and completed in 1781, and the river navigation between Solom and Wigan, 12 or 13 miles (on the upper navigation) has, we believe, been disused since the *Leeds and Liverpool* canal was completed by its side to Wigan, and the communication by the lower *Douglas* navigation to the *Ribble*, above described, was opened.

DOUGLEDGE RIVER. The course of this river is nearly north in the county of Pembroke in South Wales, from the tide-way in *Milford-Haven* to Haverfordwest bridge, its object being the supply of that town.

DRIFFIELD CANAL. Acts 7 and 41 of Geo. III. The course of this navigation is nearly north, for about 11 miles in the East Riding of Yorkshire; it is but little elevated above the sea; its general objects are the import of coals, deals, &c. and the export of farming produce; it commences at Aike-beck mouth in the *Hull* river, and terminates at the town of Great Driffeld; the first five miles is by the course of the *Hull* river to Fish-holm clough, and the remaining 6 miles is by a canal; the course of the *Hull* river serves also as a branch of 1½ mile in length to Frodingham bridge. In 1764 Mr. *John Smeaton* was consulted on this intended navigation.

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gation. In 1804 it was in contemplation to deepen the Frodingham branch, and about 2 miles of the canal up to Snakeholme lock, nearly 2 feet deeper than it was before.

DROITWICH CANAL. A&A 8 of Geo. III. The general direction of this canal is about N.E. for $5\frac{1}{2}$ miles in the county of Worcester; it is not greatly elevated above the sea; its objects are the export of salt and the import of coals, of which 13,500 tons are annually imported, and used in the boiling of salt, except what the town of Droitwich consumes. It commences in the river *Severn*, at Hawford, and terminates at Chapel bridge in the town of Droitwich; it has a rise of $59\frac{1}{2}$ feet by 8 locks. This canal was executed by Mr. *James Brindley*, and it is said to present a pattern to canal-makers by the neatness and regularity of its curves, and the stability and excellency of all its works. The proprietors were authorised to raise 33,400*l.* the amount of shares being 100*l.* The tonnage on every quarter of grain, or 6 bushels of meal, is 2*d.* and on every ton of salt, coals, or other matters, 1*s.* 6*d.* By the act for the *Worcester and Birmingham* canal (31 Geo. III.), the shares herein are guaranteed to produce 5 per cent. annually, and are to be made up by that company in case of their falling below that sum. Owing to the overflowings of the copious salt springs near Droitwich, this canal presents the curious spectacle of a salt-water canal, in the interior of the country, in which no river-fish can live.

DROMREAGH CANAL. This is a canal in Ireland, concerning which our information extends no further, than that the parliament of that country, between the years 1768 and 1771, granted 3000*l.* of the public money towards carrying on the works.

DRUMGLASS CANAL. This is a canal connecting with the Drumglass collieries in Ireland, towards the works of which canal, and those collieries, the parliament of that country, between the years 1753 and 1771, granted no less than 117,714*l.* of the public money!

DUDLEY (and Owen) CANAL. Acts 16, 25, 30, 33, and 36 of Geo. III. The general direction of this canal is nearly N.W. by a crooked course of 13 miles in Worcestershire, a detached part of Shropshire, and Staffordshire; it is situate very high, its two ends are on the eastern side of the grand ridge, while its middle, by means of two very long tunnels, is on the western side of the same. Dudley is the 49th British town with a population of 10,107 persons, and the busy and rich country through which this canal passes, furnishes an ample tonnage in the export of coals, iron, and lime, while its communication with the *Stourbridge* canal, by the Black-Delph branch, and the terminating canals, occasions a very considerable carrying trade thereon. This canal commences in the *Worcester and Birmingham* canal at Selly Oak, and terminates in the old *Birmingham* at Tipton Green; from near Dudley there is a branch of 2 miles to the *Stourbridge* canal at Black-Delph in Kingswinford, there is another branch of $1\frac{1}{4}$ mile to near Dudley town, and a branch from this last of $\frac{3}{4}$ of a mile to Dudley coal-works. From the *Worcester and Birmingham* canal to the Black-Delph branch, $10\frac{1}{2}$ miles are level, thence to near the entrance of the Dudley tunnel, about $\frac{3}{4}$ of a mile is a rise of 31 feet by 5 locks, thence through the tunnel it is level, and from thence, in the last $\frac{1}{4}$ of a mile, is a fall of 13 feet by 2 locks, to the old *Birmingham* canal: the Black-Delph branch has a fall of 85 feet by 9 locks to the *Stourbridge* canal; the Dudley branch has a rise of 64 feet in the first $\frac{3}{4}$ of a mile, the remainder thereof being level, and the colliery branch level therewith. The depth of water in this canal is 5 feet; the width of the locks on the Black-Delph branch is 7 feet. To near Lapal, or Laplat, this canal passes through a tun-

nel 3776 yards long, at Gorfsty hill it passes through another of 623 yards, under a collateral branch of the grand ridge, and at Dudley there is another tunnel of 2926 yards in length on the summit-level of the canal; the arch of this last tunnel has a height of $13\frac{1}{2}$ feet. At Cradley-pool is a large reservoir for supplying the lockage of the Black-Delph branch. It is provided, that level cuts may be made from this canal towards any coal-mine, to the extent of 2000 yards. A stop-lock is erected at the junction with the *Worcester and Birmingham* canal, by which either company has a power of preventing the other from drawing off their head of water. The Black-Delph branch was first executed, which was then united with the Dudley part of the canal which had been constructed by lord viscount Dudley and Ward; these were completed and in use before the extension or main length to Selly Oak was designed. The company has been authorised to raise 229,100*l.* the amount of shares being 100*l.* each originally. Owing to the different acts under which the parts of this canal were progressively undertaken, the rates of tonnage being different thereon; and to the variety of rates on different articles, we cannot attempt an account thereof in this short abstract, they will be found in *Cary's Inland Navigation*, p. 53 to 55, also p. 43, where certain rates are made payable to the old *Birmingham* company on account of the junction therewith, (but which have since been varied by the 34 of Geo. III. for *Birmingham* canal) and at p. 70. will be found other rates, in consequence of the junction with the *Worcester and Birmingham* canal. In the *Stratford* act (33 Geo. III.) are several regulations relating to tolls on goods passing to or from this canal; and this company are bound to make up the profits of the *Stourbridge* canal to 12*l.* per share annually, but not exceeding 3*l.* on each share.

Durham and Chester-le-Street. In February 1797 Mr. *Robert Whitworth* made a report in favour of a proposed canal from the *Tyne* to Chester-le-Street, and thence to Durham, it was estimated to cost 79,000*l.* and the probable advantage thereon to subscribers was stated to be near 20 per cent. Durham is the 74th British town, with 7,530 inhabitants; this country abounds in coals.

EDEN RIVER. The general direction of this river is nearly S.E. for about 12 or 13 miles in the county of Cumberland; its principal objects seem the export of coals, and the supply of Carlisle, which is a considerable town. It commences in the tide-way of the *Solway Firth*, and terminates at Carlisle bridge. In 1795, the *Newcastle and Carlisle* canal was proposed to join this river at Carlisle. In 1799 a rail-way from the earl of Carlisle's coal-works, near Brompton, to this river, was opened; and in 1803 another was intended from lord Lowther's coal-works at Warnell, about 11 miles distant from Carlisle.

EDINBURGH AND GLASGOW CANAL. This canal, projected about the year 1796, appears to have nearly a west direction for about 50 miles in the counties of Edinburgh, Linlithgow, and Lanark in Scotland; its objects are the export of coals and lime from Clydesdale, through which it passes, and the opening of a direct communication between Edinburgh and Glasgow. Edinburgh (and Leith) being the 3d British town, with a population of 82,560 persons, and Glasgow the 5th, with 77,385 inhabitants; from the scanty materials to which we have at present access, it seems that this canal commences in the tide-way of the *Forth*, in the harbour of Leith, and terminates in the tide-way of the *Clyde*, in the town of Glasgow, and was finished in 1802; that at Glasgow it connects with the *Monkland*, and in 1803 the *Glasgow and Saltcoats* was proposed also to join it.

Eil and Shiel canal. In the year 1803 Mr. *Thomas Telford*

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surveyed

surveyed this line of canal, being a length of 3 miles from the tide-way in Loch *Eil* within some miles of the west end of the *Inverness* and *Fort-William*, or Caledonian canal, to Loch Shiel, a fresh-water lake on the Highland coast of Scotland; Loch Shiel was found $7\frac{1}{2}$ feet higher than Loch *Eil*, and in order to conduct a 12 feet deep canal out of the former to the shore of the latter, it appears that deep cutting will be required, for about a mile to the depth of $47\frac{1}{2}$ feet, there being no water on the summit to supply a lockage up and down.

ELLESMERE CANAL. Acts 33, two of the 36, 41, 42, and 44 of Geo. III.; the general direction of this canal is nearly south for 57 miles, by a crooked course through the counties of Chester, Flint, and Denbigh, (North Wales) and Salop; its principal summit is considerably elevated above the sea; its great object is said to be the improvement of the agriculture of the extensive and fertile tracts, through which it passes, for uniting the *Mersey*, *Dee*, and *Severn* rivers, and exporting coals, lime, and slate; from the skirts of the Welsh hills. Liverpool is the 4th British town, with a population of 77,653 persons, Chester is the 25th with 15,052 persons, Shrewsbury the 36th with 14,739 persons, and Ellesmere the 112th with 5,553 persons; Wrexham, Whitechurch, and Oswestry, are also considerable towns on or near this canal or its branches. This canal commences in the *Mersey* river (9 miles above Liverpool) at Ellesmere-port in Netherpool, and terminates in the *Severn* river at Bagley bridge, very near to the termination of the *Shrewsbury* canal, to which it is proposed to be joined; at the N.W. part of Chester city, it connects with the *Chester* canal, and near the same place crosses and connects with the tide-way in the *Dee* river; from near Pulford a branch of 4 miles is proposed to Holt; from near Gwerfelt a branch of — miles to Talvern coal-works in the parish of Mould, near the head of the Cegedog valley, where there is an opportunity of constructing a reservoir of 82 acres to supply the same (this branch to pass Frood collieries, Brumbo iron-works, and Nant-y-frith lime-works); another short cut from Gresford to Allington; and a *rail-way* branch to Ruabon-brook; and to the river *Dee* at Llandinillo; from near Pont-Cyfyly, a branch to Acrefair coal-works; from Francton common, is a branch of about 25 miles passing the town of Whitechurch, to the *Chester* canal at Stoke in Acton parish near Nantwich; from which branch, another of about 7 miles proceeds from Fen-Moss to Prees Heath; from Hordley on the main line, a branch of near 11 miles proceeds to the line of the *Montgomery* canal near Llanymynech, and the Verniew river; there being from this branch another to the termination of the *Montgomery* canal at Portyvain lime-works near Llanyblodwell, and another short one is intended to Marda bridge near Oswestry. From the *Mersey* to the *Dee* (sometimes called the Wirral branch) the distance is 8 miles; from the *Dee* river to the Brumbo or Talvern branch it is $11\frac{1}{2}$ miles, with a rise of 380 feet; thence along the summit pound, and through the Chirk tunnel $8\frac{1}{2}$ miles are level; thence to the north end of the great iron-aqueduct, $\frac{1}{2}$ a mile, is a fall of 75 feet; thence to St. Martins moor, 9 miles, it is level; thence to the Whitechurch branch at Francton-common, $2\frac{3}{4}$ miles, is a fall of 13 feet; thence to the Llanymynech line at Hordley is $\frac{1}{2}$ of a mile with 33 feet fall; thence to Ormond park, $14\frac{1}{2}$ miles, is level; and thence to the *Severn* river at Shrewsbury is 2 miles with a fall of 107 feet. The Holt branch is level, the Whitechurch branch to that town, 14 miles, is level, and thence to the *Chester* canal, 11 miles, has a fall of 128 feet; the Prees Heath branch is level, the Llanymynech branch, 12 miles, has a fall of 19 feet. The depth of water in this canal is $4\frac{1}{2}$ feet, and the canal in general is calculated for boats of 70 feet long and 7 wide; but the Wirral branch is formed for boats of 70 feet long

and 14 feet wide. There is a tunnel near Chirk of 775 yards in length, and another at Weston-Lullingfield of 487 yards in length. At Pont-Cyfyly, this canal is carried over the river *Dee* in an immense aqueduct trough, composed of cast-iron plates, 20 feet wide, 6 feet deep, and 320 feet long; this is supported on 19 pair of conical stone pillars at 52 feet asunder, and the middle ones 125 feet in height! at Chirk is a very large stone aqueduct bridge of 10 arches, 200 yards in length and 65 feet high, over the *Cerriog* river; and over the *Allen* river there is also an aqueduct bridge. This canal is fed from the *Dee* river by the Llandinillo branch, and that river is compensated by a cut from Bala-pool, and, all springs within 2 miles of this canal may be taken for its use. Near Ruabon, one of *Rowland and Co.*'s balance locks was, in 1797, tried on a 12 feet fall for saving water, as before mentioned. The engineers employed on this extensive work, were Messrs. *William Jessop*, *Thomas Telford*, — *Fletcher*, and *Thomas Dadford*; the most considerable progress was first made at the northern end of the line, and in February 1796, flats laden with coals began to arrive at Chester from the Lancashire collieries by the Wirral branch, and soon after convenient passage-boats were established, for the regular conveyance of passengers towards Liverpool or back, at lower rates than is charged on *Bridgewater's* canal, according to distance. In January 1797, the navigation was continued to Beeston brook; and in the same year the southern end of the line was opened from Shrewsbury to the Weston-Lullingfield tunnel. The immense aqueduct at Pont-Cyfyly was in hand in 1804, and was more than half completed before the end of that year, as was also the stone aqueduct at Chirk. The company are authorized to raise 500,000*l.*, the amount of shares being 100*l.*, which it seems were, in 1802, at 20*l.* below par. The rates of tonnage are, for coals, culm, lime-stone, lime, and salt, $1\frac{1}{2}$ *d.* per ton per mile; for free-stone, timber, slate, iron-stone, lead-ore, iron, and lead, 2*d.*, and for all other goods 3*d.* per ton per mile, except road materials and manures (but not lime) upon the pounds, or when the water flows waste over the lock-weirs. On crossing the *Dee* river at Chester, goods pay 2*d.* per ton to the *Dee* company, and their tolls are guaranteed to the amount of 210*l.* annually. While this canal was projecting, a rival scheme was started, called the Eastern Grand Trunk from the *Severn* at Shrewsbury to the *Chester* canal at Crow's nest, with cuts to Vable-Croft, to Bonham-Furnace, Holt, and other places.

EREWASH CANAL. Act 17 Geo. III.—The general direction of this canal is nearly north for $11\frac{1}{2}$ miles along the skirt of the county of Derby, near to Nottinghamshire; its northern end is considerably elevated above the level of the sea; its chief object is the export of coals from the numerous collieries on its banks, and those on the banks of the *Nutbrook* canal which joins it at Stanton, and the *Nottingham* canal which joins it near Langley Bridge; the branch of the *Derby* canal joins it between Sandiacre and Long Eaton, and the *Trent* canal near Sawley. It commences in the *Trent* river near Sawley (opposite nearly to the *Loughborough* navigation or Soar river,); and terminates in the *Gromford* canal at Langley Bridge, the rise being 1083 feet; there is an iron *rail-way* branch to Brinsley coal-works, on which an experiment was, as before related, made about the year 1800, on the load which one horse could draw both up and down the declivity. By the act of 33 of Geo. III. for *Derby* canal, a reduction of the rates between the junction therewith and the *Trent* river was made, conditionally, that no other junction be made between this canal and Derby, but the present one near Sandiacre; and by the 34 of Geo. III. for *Trent* river, the annual rent of 5*l.* is commuted for a toll of 6*d.* on every laden boat which shall cross the *Trent* between the Soar

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Soar river and this canal. A reservoir belonging to the *Nottingham* canal has a gauge-fluice, which furnishes a regular and daily supply of water to this canal. The first survey for this line of canal was made in the year 1776.

ESKE RIVER, (*Montrose*). This river is navigable but a short distance in the tide-way from the German Ocean to the town of Montrose, in Angus county in Scotland. Montrose is the 67th British town, with 7,974 inhabitants.

ESKE RIVER, (*Whitby*). The navigable part of this river is but short, in a S.W. direction in the East Riding of Yorkshire: it commences at the German Ocean, and extends to Whitby bridge. In 1765 Mr. *John Smeaton* was consulted about clearing this river and the harbour of Whitby, of the shail or refuse ore, from which alum had been manufactured, and whereby the harbour had become in time nearly choked up. Whitby is the 75th British town, with a population of 7,483 persons; within a few years past, a pier has been built with free stone, under the direction of Mr. *John Rennie*, for the improvement of the mouth of this harbour.

EXE RIVER. The course of this river is nearly N.W. for about 10 miles in the county of Devon; its principal object seems the supply of Exeter and Topsham; near Topsham it is to be joined by the *Grand Western* canal. It commences in the English Channel at Exmouth, and terminates at the city of Exeter, which is the 21st town in Britain, with 17,398 inhabitants: from Exeter it was in 1800 proposed to continue the navigation to Crediton; and in 1769, the *Exeter and Uphill* canal was proposed to be made from the same place.

Exeter and Crediton. In the year 1800 it was proposed to make the rivers Exe and Creden navigable, from Exeter city to the town of Crediton, about seven miles, above Exeter quay on the river Exe.

Exeter and Uphill. In 1769 Mr. *John Brindley* surveyed the country for a canal from the river Exe at Exeter, by Tiverton, Wellington, Taunton, and Glastonbury, to the British Channel near Uphill; the objects of which have been since embraced in the *Grand Western* canal.

FERGUS CANAL. This is one of the Irish inland navigations, in aid of which, public money was from time to time granted, though in the present instance we are told that it amounted to no more than 85l.

FORTH RIVER, (or *Firth*). This principal river of North Britain has its course nearly west for about 70 miles between the counties of Fife, Haddington, Edinburgh, Linlithgow, Stirling, Perth, and Clackmannan, the first 33 miles being a very wide estuary, the next 18 miles are still of considerable width, and the last 13 miles next Stirling are remarkably crooked. An immense general trade is carried on upon this river, and for the supply of the metropolis of Scotland, assisted by the *Edinburgh and Glasgow* canal, that joins it at Leith, the *Burrowstowness* at that town, the *Forth and Clyde*, or great canal at Grangemouth, the *Caron* river near Rothkennar, and the *Devon* river near Cambus Quay. Edinburgh (with Leith) is the 3d British town, with 82,560 inhabitants, Dumferline is the 52d, with 9,980 persons, and North Berwick, Crail, Anstruther, Dyfart, Kirkaldie, Kinghorn, Bruntisland, Inverkeithing, Musselburgh, Queen's-Ferry, Burrowstowness, Linlithgow, Falkirk, Culrofs, Clackmannan, Alloa, and Stirling, are also considerable towns on or near this fine river. It commences in the German Ocean, and terminates at Stirling bridge, and is navigable for ships through a great part of its course; at Cambus Quay the spring tides rise 20 feet, but below this there are lands called the Thrask Shallows, concerning the removal of which, Mr. *John Smeaton* was consulted in 1767. In 1801, the channel south of Inch-keith isle was

deepened, to enable ships to approach Leith harbour more safely and readily. Leith harbour has undergone great improvements of late years under the acts of the 28, 38, 39, and 45 of Geo. III., by the last 25,000l. of the public money was granted for the wet-docks and other works which have been carrying on there under Mr. *John Rennie*, since the laying of the foundations, 14 May 1801. Methel harbour on the north side of the *Forth* is also under improvement, and by the 45 of Geo. III., 2,000l. of the public money was granted towards the building of the pier there. In the year 1767, Messrs. *Watt* and *Morison* surveyed the upper part of the *Forth* river, and proposed to extend a navigation from Sterling bridge to the slate and lime quarries in Aberfoil, on which the opinion of Mr. *John Smeaton* was also taken.

FORTH AND CLYDE CANAL. Acts 8, 13, and 24 of Geo. III.—The general direction of this great canal is nearly west for 35 miles, in the counties of Stirling, Dumbar-ton, and Lanerk, in Scotland: it crosses a low part of the grand-ridge between the tide-ways of the east and west seas; its principal object is a communication between those important rivers, the *Forth* and the *Clyde*, and between the northern metropolis, and the great manufacturing towns of Glasgow, Paisley, &c.; near to Grangemouth the *Burrowstowness* canal joins it. Glasgow is the 5th British town, with a population of 77,385 persons, and Falkirk the 59th, with 8,838 inhabitants. Kirkintulloch and Dumbar-ton are also considerable places near the line. This canal commences at Grangemouth harbour in the *Forth* river, and terminates at Bowlings bay near Dalmuir-Burnfoot, in the *Clyde* river. There is a cut of 2½ miles to the town of Glasgow, where it joins the *Clyde* river, the *Monkland* canal, and the *Edinburgh and Glasgow* canal; and it was in 1803, proposed to join the *Glasgow and Saltcoats* canal; there is another cut with a lock into the *Caron* river at Caron-shore, near the great Caron iron-works. From low-water in the *Forth* in Grangemouth lock, N° 1, to lock N° 20, 10½ miles, is a rise of 165 feet; thence to lock N° 21, the summit-level is 16 miles, and thence to low water in the *Clyde* at Bowlings bay lock, N° 39, is a fall of 156 feet; the width of the canal is 56 feet at top, and 27 at bottom, and the depth of water 8 feet; each lock is 75 feet long, and 20 feet wide in the clear, and vessels of 70 or 80 tons are used. This canal is crossed in 33 places by draw-bridges, has 33 culverts or arches under it, and 10 large aqueduct bridges; that over the Kelvin is 400 feet in length, and 70 feet high above the surface of the river, (see figs. 19, 20, and 21, *Canals*, Plate II.) and there is a large aqueduct which crosses the turnpike road from Glasgow to Stirling at Kirkintulloch. At Kilmananmuir is a reservoir of 70 acres extent, and 22 feet deep at the sluice; and near Kilsyth is another of 50 acres, 24 feet deep for supplying the summit-level of this canal. In Bowlings-bay, and near the Kelvin aqueduct, are dry-docks, and other conveniences for repairing of vessels and boats. Mr. *John Smeaton* was first employed to survey this line in 1764, and he laid the present design, and executed a considerable part of the eastern end before 1775, when the work stood still for some years, after which, Mr. *Robert Whitworth* was called in; he completed the remainder, and it was opened with great solemnity on the 28th of July 1790. The design of a canal between the *Forth* and *Clyde* has been at times entertained ever since the reign of Charles II., and besides the above engineers, since the year 1723, Messrs. *Gordon*, *Mackell*, *Watt*, *Brindley*, *Golborne*, *Thomas Teoman*, &c. have been consulted or employed. The canal was first made to commence in the *Caron* river, about a mile from its mouth, but was afterwards continued into the *Forth* at Grange-mouth

mouth harbour. The proprietors were authorised in their first act to raise 200,000*l.* in 100*l.* shares; after which, 50,000*l.* of the public money was granted to aid the work; in 1783, 212,000*l.* had been expended, and no dividend or interest had been paid on the shares. The rate of tonnage is 2*d.* per ton per mile on all kinds of goods, except lime and lime-stone, which is to pay $\frac{1}{2}$ *d.*, and iron and iron-stone 1*d.* per ton per mile, while road-materials (except lime-stone) and manures are to pass toll free. For unloading or loading of British or Irish vessels in Grangemouth harbour, 1*d.* per ton is to be paid, (by 24 Geo. III.) and for foreign vessels 2*d.* per ton. Rafts of fir timber are allowed to be floated upon this canal and pass the locks, these often contain 70 tons each. An accident is related of a vessel coming down from the westward on this canal, when the wind blew strong from that quarter, and not being stopped in time at one of the locks, the bore down the gates, and went down suddenly into the pound below. In December 1801, a vessel constructed by Mr. Symington, (as already described) was tried on this canal for dragging or towing boats, by the operation of a steam-engine; to the head of this vessel flampers were applied, that could be worked by the engine for breaking ice, when the canal is frozen over.

FOSS-DYKE CANAL. The general direction of this navigation is nearly S.E. for 11 miles, in the counties of Lincoln and Nottingham; it is upon one level, not much elevated above the sea, though a great distance from it, and presents the curious instance of a canal discharging its waste water into one river (the *Witham*), while flood-gates are necessary at the other end, to keep out the waters of the other river (the *Trent*); its object is a communication between these two rivers, for supplying coals and exporting farm produce. Lincoln is the 76th British town, with a population of 7,398 persons. This canal commences in the *Trent* river at Torksey, and terminates in Brayford meer, a natural pool in the *Witham* river, near Lincoln. It has a lock at Torksey, constructed on the principle of a sea-lock, that is capable of penning the water into the canal, or out of it, according to the circumstance whether the *Trent* or it may be the lowest; between Brayford meer and Lincoln high-bridge, a hard of gravel or shallow, called Brayford head, held up the water in this canal, to about 2 $\frac{3}{4}$ feet deep, which otherwise would, in dry times, have been emptied into the *Witham*, too low for navigation. Mr. John Smeaton and Mr. John Grundy were consulted in 1762, and the former engineer again in 1782, when he recommended raising the banks of this canal to obtain a better depth of water, cutting off its connection with the *Witham* by a pound-lock, and supplying it with water by an aqueduct or feeder, from a reservoir to be made near the *Witham*, south of Brayford meer. We are not acquainted with the date when this canal was first dug or made navigable; Mr. Ellison's wharf thereon, near its east end, was, it appears, built about 1742.

FOSS NAVIGATION. Acts 33 and 41 Geo. III.—The direction of the *Foss* river, which this navigation follows, is nearly N. by a crooked course of about 13 miles, through the North Riding of Yorkshire: its elevation is not very great above the level of the sea; its objects are the supply of the city of York, the import of coals for the use of the adjacent country, and to effect a better drainage of the same. York is the 23d British town, with 16,145 inhabitants. This navigation commences in the *Ouse* river at the city of York, and terminates at Stillington mill. It is fed by a reservoir on Oulstone moor: it appears that the corporation of York were by a licence of king Richard II. required to erect and maintain proper bridges over this river. This company were authorised to raise 45,400*l.* the amount of

shares being 100*l.* each. The rates of tonnage will be found in *Phillips' 4to. History, Appendix*, p. 81 and 82; and in the last act, by which an additional 1 $\frac{1}{2}$ *d.* per ton, on heavy articles, were imposed, and by which the proprietors were authorised to proceed no higher than Sheriff-Hutton bridge with their works, until the necessary funds were accumulated to proceed with the remainder of their line. Some years ago, a pleasure-boat, made wholly of sheet iron, was tried on this navigation, 12 feet long, and capable of carrying 15 persons, and yet so light that two men could carry it.

GLAMORGANSHIRE CANAL. Acts 30 and 36 Geo. III.—The general direction of this canal is nearly N.W. for 25 miles, in the county of Glamorgan in South Wales. Its objects are the export of the produce of the immense iron, coal, and lime works in the neighbourhood of Merthyr Tydvil, &c. and the supply of the rapidly increasing population thereof; at Eglwysila the *Aberdare* canal joins, and the *Cardiff and Merthyr* rail-way runs by its side, and joins it at those two places. Its northern end is considerably elevated. Cardiff and Caerphilly are considerable towns on or near the line; it commences in a sea-bason, or dock, in the *Severn*, at the Lowyer-layer near Cardiff, and terminates near the town of Merthyr; it has a rail-way branch from Merthyr to Dowlais iron works. From the tide-way at Lower-layer to Merthyr is a rise of near 600 feet, and during a part of this distance the canal skirts precipitous mountains at the height of near 300 feet above the river Taw or Taaff, which it closely accompanies through its whole length. The floating dock at Lower-layer is 16 feet deep, in which a great number of ships, of 300 tons burthen, can lie constantly afloat, and load or unload, either at the spacious warehouses on its banks, or from, or to, the boats belonging to this canal, or the trams used on the *Cardiff and Merthyr* rail-way, that here commences. There is a large aqueduct bridge over the Taw near Gallygare. This company were authorised to raise 100,000*l.* and to the powers for raising the last 10,000*l.* this singular condition was annexed, viz. that the whole concern should be completed within two years, after which no further money should be applied, except for repairs. At Merthyr there is a famous water-wheel, made of cast-iron, 50 feet diameter, at Mr. Crawshaw's works; the water being conveyed thereto for a great distance in an iron aqueduct.

Glasgow and Saltcoats. In May 1803 the line of country between the *Clyde* river at Ardrossan, near Saltcoats, and the *Clyde* river again at Glasgow (passing Paisley and connecting with the *Cart* river) was surveyed by Mr. John Rennie; in 1805, the subject was revived, and met the support of the earl of Eglintown and many others, coupled with the design of building a pier on a ledge of rocks near Castle Craigs, and forming wet-docks, &c. to be called Ardrossan harbour, for which an application was made to parliament in the same year. At Glasgow this canal would connect with the *Forth and Clyde*, the *Monkland*, and the *Edinburgh and Glasgow*: the line thereof is through a country rich in coals and lime-stone.

GLENKENNS CANAL. Act 42 Geo. III.—The direction of this canal is first N.E. and then N.W. for about 27 miles, in Glenkens, in the county of Kirkcudbright in Scotland: it is not very greatly elevated; the object of it is the export of the coals, iron-stone, lime, and other minerals with which the country abounds; Kirkcudbright and New Galloway are considerable towns near the line. It commences in the tide-way in the *Dee* river at Kirkcudbright, and terminates in the boat-pool at Dalry. There is provision made for branches to the neighbouring mines and rail-ways, and inclined planes may be substituted, instead of a canal and locks in any part. The company is authorised to raise

raise 45,000*l.* the shares being 100*l.* each. but it is provided, that the works are not to commence until 20,000*l.* is subscribed, and that within five years, or the powers of the act are to cease; water may be taken from within 2000 yards of the line, except certain streams used for irrigation.

GLOUCESTER AND BERKLEY CANAL. Acts 33, 37, and 45 Geo. III.—The general direction of this canal, one of the largest in England, is nearly N.E. for 18½ miles, in the county of Gloucester; it is but very little elevated above the sea; its object is to shorten the navigation for ships by a serpentine course of 28 miles on the *Severn* river, between Berkley and Gloucester; near Wheatenhurst it crosses and unites with the *Stroudwater* canal; Gloucester is the 72d British town, with a population of 7,579 persons; Berkley is also a considerable place. This canal commences with a sea-lock in the *Severn* river at Berkley-pit, and terminates in a grand and capacious basin, connecting with the *Severn* river at Gloucester, it has a short branch to a new wharf at Berkley town, and another of about 2 miles in length to the *Severn* river at Hock-crib in Arlingham; the whole is on one level with tide-locks at its connecting points with the *Severn* to preserve its water at one constant height. This canal is 70 feet wide, and 15 or 18 feet deep in water, and the locks, &c. thereon, are capacious enough to admit ships of 300 tons burthen to pass! The company are authorised to raised 200,000*l.* in 100*l.* shares. The tonnage varies on different sized vessels, and is too long for us to insert, the particulars will be found in *Phillips' 4to. History, Appendix, p. 83 and 84.* Unforeseen difficulties have attended the execution of this wide and deep canal, by intersecting a hard rock for great distances in the level meadows, where no such thing was expected. Some immensely large slips have happened in the banks, and the walls of the Gloucester basin slipped in, notwithstanding the land-ties which had been provided; the upper end of the canal, for several miles, has been finished; in 1797, it was said that only 6 miles remained to be cut; and we hope, that the act of last sessions will be the means of speedily completing the whole. Mr *Haskew's* machine, calculated to assist in excavating a canal, was here tried in 1796, as before mentioned.

Gloucestershire Rail-way. In the year 1804 it was proposed to construct a rail-way from the *Avon* river at Bitton below Bath to Sodbury coal-works in Gloucestershire, with branches to Pucklechurch, Haul-lane, Coal-pit-heath in Westerleigh, Smith's tynings, and other collieries, in order to bring their produce to Bath and Bristol, and for the consumption of the interior of the country, by means of the *Kennet and Avon* canal.

GRAND CANAL, (Ireland). This canal was commenced, we believe, soon after the year 1753, but we have not the dates of the earlier acts; since the union there was one passed, the 43 Geo. III. The general direction of this canal is nearly west, for 61½ miles through Dublin, Kildare, and King's Counties, in Ireland; it passes a low part of the grand ridge of Ireland, on the Bog of Allen. Its objects are the supply of Dublin with coal, &c., the varied produce of the banks of the *Shannon*, and opening an inland communication through the country. It commences in a grand basin in James-street, Dublin (which connects with the *Liffey* river and the new *Docks*), and terminates in the *Shannon* river, at Tarmunbury, near Moy's Town; it has collateral branches to the *Boyne* river at Edenderry, to the *Barrow* river at Moneastraven, and also at Portarlinton; there are also branches to Naastown and to Johnstown. This canal is, we believe, 5 feet deep, the locks are 80 feet long and 16 wide, in the clear, and are built of hewn stone; it has employed the attention of various engineers, among whom are mentioned, Messrs. *Omes, Vallency, John Traill,*

William Jessop, &c. In the year 1770 this canal had proceeded from Dublin into the Bog of Allen, when, owing to mismanagement, it stood still for several years, and it was not until the beginning of 1804 that the whole line was finished and opened. The sums of the public money which have been granted by the parliaments to aid this work are immense; between 1753 and 1771 they amounted to 78,231*l.* It has been proposed to reduce the tolls or tonnage since the opening of this canal. In the beginning of the present year (1805) it was proposed to continue a branch from this canal, near Athy, for 9 miles, to the foot of the Doonane Hills, in Queen's county, and thence to tunnel two miles into the hill, to drain the rich veins of coal therein, and bring out their produce.

GRAND JUNCTION CANAL. Acts 33, 34, three of the 35, 36, 38, 41, 43, and two of the 45 Geo. III.—The general direction of this canal is nearly north-west for 90½ miles, in the counties of Middlesex, Hertford, Buckingham, Bedford (a very small distance), and Northampton. It has a summit of considerable height near Tring, which it passes without a tunnel; and near its northern end it crosses the grand-ridge by a tunnel. Its principal objects are, a communication between the metropolis and the various canals of the midland counties, the supply of coals, deals, slate, &c. to the several towns on the line and branches, and the export of the agricultural products, lime, flints, &c. of the country through which it passes; at Northampton it joins the *Nen* river by a rail-way branch, and the same is intended there also to join the *Leicestershire and Northamptonshire Union* canal. London, as is well known, is the first town in Britain for population, with 864,845 inhabitants, and Northampton is the 85th, with 7,020 persons; Brentford, Uxbridge, Rickmanfworth, Watford, St. Albans, Hemel-Hempstead, Berkhamstead, Tring, Wendover, Aylesbury, Leighton-Buzard, Fenny-Stratford, Newport-Pagnel, Stoney-Stratford, Buckingham, Towcester, and Daventry, are also considerable towns on or near this canal or its branches. The commencement of this canal is in the river *Thames*, near the extremity of the tide-way at Brentford creek, and its termination in the *Oxford* canal at Braunston. From Bull bridge a branch, 13½ miles in length, goes to Paddington, one of the environs of London; to the town of Rickmanfworth, there is a cut of about ¼ of a mile, with a lock at its entrance; from Bulbourn head a branch extends for 6¾ miles to Wendover; from Cosgrove a branch of 1¼ mile extends to Stoney or Old Stratford, and thence 9½ miles further to Buckingham; and from Gayton a rail-way branch of 5 miles extends to the river *Nen*, and the intended termination of the *Leicestershire and Northamptonshire Union* canal at Northampton. To Watford a branch of 2 miles, and thence about 8 miles farther to St. Albans, has been surveyed and provided for in the acts; another to Aylesbury of about 6 miles, and another to Daventry of 1½ mile in length, but these last are not executed. From the *Thames* at Brentford to Two-waters is 28½ miles, with 268 feet rise; thence to Cowroast is 7¼ miles, with a rise of 127 feet; thence to the Wendover branch is 3¼ miles, of the highest summit-level; thence to the crossing of the Ouse river, between Wolverton and Cosgrove, is 25¼ miles, with a fall of 192 feet (this being the lowest place); thence to Stoke Bruern is 6½ miles, with a rise of 112 feet; thence (through the Blifworth tunnel) to the south end of Whitton parish, 13½ miles, is level; thence to Whitton mill, in Long Buckby, ¾th of a mile, is a rise of 60 feet; thence along the summit-level, and through Braunston tunnel to its north end, 4¼ miles, is level; and thence to the *Oxford* canal at Braunston, near 1 mile, is a fall of 37 feet. The Paddington branch is level (at about 50 feet above the *Thames*, and 48½ feet above the Strand-pavement at Exeter-change).

change). The Wendover branch is level, and connects with the Bulborne or Tring summit pound: the Buckingham branch has a rise of 15 feet; the Northampton branch has a fall of 120 feet, and the cut to Daventry is to have a rise of 60 feet. The width of the main line is 36 feet at top, about 24 feet at bottom, and $4\frac{1}{2}$ feet deep in water: the Wendover branch is 28 feet wide at top, 18 at bottom, and $4\frac{1}{2}$ feet deep; and the Buckingham branch is only 20 feet wide at top, 10 at bottom, and $4\frac{1}{2}$ feet deep in the general. The Northampton rail-way, which is now (October 1805) nearly or quite finished and ready for opening, is of iron, and double, that is, has two roads for the carriages going different ways. The locks on the line are 86 feet long, 15 feet wide in the clear, and rise about 7 feet each on the average, requiring about 9030 cubic feet, or 250 tons of water to fill them each time that a barge passes. On the line there are 101 locks, besides the 9 spare ones in Wolverton-valley; on the Buckingham branch there are 2 locks. Two kinds of vessels are in use upon this canal, barges with square heads and sterns, and flat bottoms, that carry 60 tons, and boats with sharp ends, or nearly so, of half the width, that carry 25 tons. At White-friars, just above Black-friars-bridge, on the *Thames*, this company built extensive warehouses, over a dock, in which barges lay afloat from one tide to the next; these are now let to Mr. *Pickford*, the great waggon and boat-master. At Paddington a spacious basin or straight cut, 400 yards long and 30 wide, has been formed with wharfs at its head, and others are daily extending westward along its sides; behind this, on the north side, is a spacious yard for a vegetable and a hay and straw market, with immense sheds, under which loads of those articles can stand in the dry when it rains; and on the south side pens are erected and provision made for a large cattle market. The number of wharfs erected on this extensive line and its branches by individuals are too great for us to attempt to particularize them. The number of culverts or small water-courses under the canal and its branches are very great. And on the towing path there are a number of large and high wooden bridges for crossing the entrances to branches, docks, or over streams of water; for some distance from Paddington provision is made under the bridges for a towing path on each side of the canal. The tunnel between Stoke-Bruern and Blisworth (already described), is 3080 yards in length, 15 feet wide, and 19 feet high, at 60 feet below the top of Blisworth hill, through which it penetrates. Braunston tunnel, between that place and Daventry, is 2045 yards in length: another tunnel was at first intended near King's-Langley for avoiding Cassiobury, and other parks in the Colne valley; but an agreement was afterwards come to with their owners for a passage through them, instead of tunnelling. Between Cow-roast and Bulbourne there is an immense deep-cutting for passing the great range of chalk-hills near Tring; this extends for 3 miles, and is 30 feet deep in the highest part; near Dawley there is a great length of deep-cutting through the immense bed of gravel at that place; at the ends of the Blisworth tunnel, and at several other places there are also deep-cuttings. Between Wolverton and Cofgrove a stupendous embankment, with three aqueduct arches under the same, has been constructed, since the locks were made for crossing the Ouse river, as above mentioned, over which the canal has, since August 1805, been conducted, and by which 4 locks on the south side of the valley, and 5 locks on its north side, are avoided, except a lock of 18 inches rise, near the north end of the embankment, by which 12 miles in length of level pound is held up (on the line and Buckingham branch), and separated from 10 miles of level pound south thereof, to beyond Fenny-Stratford town, (where another lock of only 18

inches rise occurs, to hold up a pound of some miles in length that was intended, but for a mistake in the levelling, to have been in one pound); this embankment is $\frac{1}{2}$ a mile long, and 30 feet high, where it crosses the Ouse. At Weedon-Beck, and at Bugbrook, there are also most stupendous embankments, and river and road aqueduct-arches, and many lesser embankments and aqueduct bridges occur on the line and branches; those over the Brent river, and over Bays-water on the Paddington branch are considerable. On Harefield Moor there is a very wide and large piece of water on the canal: others at Great Berkhamstead, at Halton park, and two other places on the Wendover branch. Five considerable reservoirs have been constructed for preserving water for this canal, or the mills, whose streams have been diverted for its use; that at Aldenham covers 68 $\frac{1}{2}$ acres, at Willstone is one of 40 acres, and those at Welton-Turville, Braunston, and Daventry, are also of very considerable dimensions. The principal feeder for the southern summit is at Wendover, and there are others at Little Tring, Tring, and Milwell (the last being arched over for $\frac{1}{2}$ of a mile). The middle and lower part of the line is supplied by a feeder at Soulbury, and the northern summit is supplied by a feeder from Watford, near Daventry; besides which, that summit has had its banks raised to accumulate an extra depth of water in wet times, and a steam-engine has recently been erected for pumping up the water out of the level of the *Oxford* canal to that summit, that is let down therefrom by the lockage. At Little Tring an engine was, in June 1803, erected for pumping the water collected in Willstone reservoir into the Wendover branch of the southern summit-level; and at Nash mill, some distance below Two-waters, in the Colne valley, an engine is now erecting to return the lockage water of 4 locks that are there placed near to each other. On the south and north sides of the Tring summit, several pairs of side ponds have been lately added to the locks, for saving part of their consumption of water. Where the Towcester river (the Tove) is crossed and joined there are very considerable weirs or tumbling-bays, and others on the old course, in the Wolverton valley; and, between Great Berkhamstead and Uxbridge, these are continually occurring, owing to the canal having unfortunately been conducted into and through almost every mill-dam in that distance: overfalls of less size are also very common on every part of the line, so are stop-gates, trunks, and every other necessary appendage and convenience to a navigable canal. Mr. *William Jessop* was the engineer to this extensive concern; Mr. *James Barnes* and Mr. *John Holland* were employed in executing different parts of the works, on which Mr. *Thomas Telford* was lately employed to report his opinion; since 1803 Mr. *Benjamin Bevan* has been employed in repairing the leaky parts, constructing side-ponds, &c. in the middle district of this canal. The works on this canal commenced at both of its extremities, soon after the passing of the first act; and the tunnel at Braunston being completed, the navigation was opened, in July 1796, as far southward from the *Oxford* canal, as the great embankment at Weedon Beck; in June 1797, the same was extended to the next great embankment at Bugbrook; and about November in the same year, to the north end of the intended tunnel at Blisworth. Beginning at the southern end in the *Thames*, the navigation to Two-waters was completed in June 1798, and in June 1801 the branch therefrom to Paddington was opened; in the year 1799, the canal was completed to Bulbourne, and the branch therefrom to Wendover; in June 1800, it was extended to Fenny-Stratford; and about October 1800 to the south end of the intended tunnel at Blisworth; at the same time a double iron rail-way of near $3\frac{1}{2}$ miles in length (since removed) was laid across Blisworth

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Hill, to connect the two parts of the canal, and form the much wished for grand junction; in May 1801, the branch to Buckingham was opened; it was not until March 1805 that the Blisworth tunnel was completed, and the navigation of the whole line opened; and, lastly, in August 1805, the immense Wolverton embankment was opened for improving the same, and avoiding 8 locks, but which locks still remain by its side, as a reserve, in case of accident, to this immense mound of earth, or the three large arches under it. This company were authorised by their first nine acts to raise 1,528,000*l.* to which their first act of last session made a considerable addition; and it is feared that the expenditure will altogether exceed two millions sterling! The shares are of 100*l.* value each, which have at some periods of the business sold as high as 210*l.*, and at others have been down at 65*l.*! Shares in this concern are allowed to be split into such small portions among different holders, as $\frac{1}{4}$ th or $\frac{1}{12}$ th each. On the original shares no dividend or interest has yet been received, but now as the tolls amount to full 7,000*l.* per month, it is hoped a dividend will begin to be made. Inland coals from the rich and inexhaustible mines with which this and other canals form direct communications, were forbid under severe penalties (although two legislative attempts to enforce the same proved inefficient) to be brought nearer to London than the N.W. end of Grove park in Hertfordshire, until the last act of the late session mentioned above, by which 50,000 tons of such coals are allowed to be brought to Paddington in the current year, on paying a duty equivalent to that paid in the *Thames* on sea-brought coals. The market at Paddington, after an ineffectual and most extraordinary opposition from the city of London, was opened in May 1802, for the sale of fat cattle, hay, straw, corn, vegetables, &c. By the act 41 Geo. III., this company was authorised to lay pipes in certain streets in Paddington, Mary-le-bone, &c. for supplying the inhabitants with water; but at that time, certain millers, whose dams the line had been made to pass through, were not consulted. In June 1801, packet-boats were established, that continue to pass regularly at stated hours during most of the year, for the conveyance of passengers and parcels between London and Uxbridge; and for some time after the opening of the Buckingham branch, a boat went regularly between Paddington and that town; but the number of passengers and parcels were found inadequate to support the expence of such an establishment. Trading boats are not allowed to pass along upon this canal except in the day time, unless such as have a special licence from the company for such purpose. Mr. *Pickford* has a great number of boats, which proceed as regularly day and night upon this canal, and the other canals north of it, as the mail-coaches do on the roads, although with less expedition. A common trading boat has been known to arrive at Paddington in 63 hours from Coventry. In December 1799, the experiment was first tried, of bringing fat Oxen to London in boats by means of this canal. The rates of *tonnage* on this canal were at first very low, as will be seen in *Phillips' 4to. History, Appendix*, p. 91. Additional tolls were provided in the 43d of Geo. III. for passing the Blisworth tunnel and Wolverton embankment; and by the first act of the last sessions (45 Geo. III.), the rates on the whole line and branches were varied, and increased for short distances. The act of the 33d provided certain rates, which are to be paid to the *Oxford* company (See *Phillips' Appendix*, p. 93.) for goods passing thereon to or from this canal, and this company is bound (since the beginning of 1804), to make up the same to the amount of 10,000*l.* per annum. This company is

also bound to pay annually to the city of London the sum of 600*l.* for the liberty of making a junction with the *Thames*; and all goods passing into or out of the same on this canal are to pay $\frac{1}{2}$ d. per ton, to be applied towards improving the middle navigation of the *Thames* river. The intended cut to Aylesbury was, on account of the scarcity of water at Marlow, where it was to join the line, changed for a rail-way, and in the year 1803, the same was begun; the iron rails were actually purchased, and brought to the spot, but, alas! in one of those reverses of favour to which borough towns are ever liable, the work was stopped, the rails were ordered to be sold, and years may now perhaps elapse before Aylesbury is permitted to enjoy the advantage of a canal or rail-way communication. About the year 1793, an extension of the Rickmansworth branch of this canal was proposed to the town of Chessham. In 1793, and again in 1802, it was proposed to extend a branch from near Slapton to the foot of Puddle-hill between Dunstable and Hockliff; one object of which was the export of the valuable white free-stone from the quarries at Tottenhoe; this object may, however, it is presumed, be obtained without such cut; and stone of equal quality be got in several places on the summit branch. In the year 1802, the country westward of Uxbridge was surveyed by Mr. *John Holland*, with the intention of extending a branch of this canal from below Cowley lock, (continuing the level of the Paddington water) to the *Thames* at Harleford in Great Marlow parish; it was also proposed, after crossing and uniting with the *Thames* at this place, to extend this branch, by a rise of three locks, to a side cut of the *Kennet* river at St. Giles's in Reading, with a branch therefrom to the *Thames* at Sunning: the objects of this branch were, a more direct communication with the Bristol channel, by means of the *Kennet and Avon* canal, the supply of the country bordering on this canal and its branches with peat manure from near Reading, the better supply of, and communication with London, by means of a canal without a lock, between the *Thames* at Great-Marlow, and Paddington, the gaining from the *Thames* that supply of water, which had been denied from the Colne for the intended water-works, and the lockage of the *London* canal; which was, in 1802, proposed to extend from the basin of this canal at Paddington to the *London Docks*, and thereby to communicate with the *Thames*; after which a rail-way was, in the same year, proposed to extend from Paddington over nearly the same ground. It was before 1773 that a canal was first proposed from Paddington to Uxbridge, nearly in the route of the line now accomplished; and in 1773, Mr. *James Sharp* proposed an extension of this to the *Kennet* river. In June 1803, a survey was taken for extending the intended Aylesbury branch by Tame to the *Thames* and *Isis* navigation, and *Wilts and Berks* canal near Abingdon. And in the same year, the *Leicestershire and Northamptonshire Union* canal was proposed to be joined to the line of this canal at Long-Buckby wharf near Daventry, instead of joining its Northampton branch at that town.

GRAND SURRY canal. A& 41 Geo. III.—The general direction of this canal is nearly S.W. for about 12 miles, by a crooked course in the county of Surry, and through a small part of Kent. It is not greatly elevated in any part: its objects are the supply of the neighbourhood through which it passes with coals, deals, manures, &c. the bringing of vegetables, and other articles for the supply of London: forming a communication between three points of the *Thames* river, and with the *Croydon* canal, which it joins near Deptford. It commences in the river *Thames* at Wilkinson's gun-wharf in Rotherhithe, and is to terminate at the town of Mitcham; near Walworth a branch of about $\frac{3}{4}$ of a mile goes off to join the *Thames* at Vauxhall.

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Vauxhall creek by Cumberland gardens. There is to be a cut of near $1\frac{1}{2}$ mile to Horsfonger lane; another of $\frac{1}{2}$ a mile to Peckham; another of one mile to But-lane Deptford; another of $\frac{1}{4}$ of a mile to his majesty's victualling office and the dock-yard at Deptford, and another of $\frac{1}{8}$ of a mile into Greenland dock, by which it will again communicate with the *Thames* river.

From the river *Thames* to the junction of the *Croydon* canal the distance is 2 miles, and nearly level with high water in the tide-way of the *Thames*, at which height the water is to be held up by tide or entrance locks; thence to the Vauxhall branch at Kennington common it is 3 miles and level; thence to Brixton-caufeway, $1\frac{1}{4}$ mile, it has a considerable rise; thence to the proposed Kingston branch, $4\frac{1}{2}$ miles, it is level; and thence to Mitcham town it is $\frac{3}{4}$ of a mile: the Vauxhall, Horsfonger-lane, Peckham, But-lane, King's yard, and Greenland-dock branches, are all level. This canal is calculated for wide or river boats: near the commencement, at Wilkinson's wharf, a large basin is designed, and a smaller one at But-lane near the Greenwich road: across Rushey-green to Brixton-caufeway an inclined plane is intended. Mr. *Ralph Dodd* was, we are told, the contriver of this canal, and under his directions the works were begun, and considerable progress made between Rotherhithe and the Peckham branch; but for more than two years past, little further progress appears to have been made. The company were authorized to raise 60,000*l.* in 100*l.* shares. The tonnage on this canal varies from 2*d.* to 6*d.* per ton per mile on different kinds of goods. The company are to pay a rent of 60*l.* per annum to the city of London for communicating with the *Thames* river. Collateral cuts to the extent of 1500 yards may be made by consent of the land owners. In 1800, it was intended to extend this canal $6\frac{1}{2}$ miles further to the *Thames* river on the south side of the town of Kingston, which was to pass the *Surry iron rail-way* at Merton abbey, by an aqueduct bridge 11 feet high in the clear, and the Wandle river by another 15 feet above its surface; from Norbiton common this was intended to branch again to the town of Epsom, $5\frac{1}{2}$ miles, and from Mitcham the canal was there also proposed to be extended to the town of Croydon. In the same year there was also a proposal for extending the intended Kingston branch to the *Wey* river (near the commencement of the *Basingstoke* canal), as part of one of the lines between *Portsmouth* and *London*. The *Croydon* canal company are to have a dock or basin for their boats by the side of this canal near the *Thames* at Rotherhithe; which, with the entrance lock and basin of this canal, are now excavating, and seem on a scale calculated for small ships.

GRAND WESTERN CANAL. A& 36 Geo. III.—The general direction of this canal is nearly N.E. for about 35 miles, in the counties of Devon and Somerset: it crosses the south-western branch of the grand-ridge; its objects being a connection between the southern coast and the Bristol channel, the supply of the country with coals, deals, &c. and the export of farming produce. Exeter is the 21st British town, with a population of 17,398 persons; Willington is the 73d, with 7,531 persons; Tiverton the 94th, with 6,505 persons, and Taunton, the 106th, with 5,794 persons; Topsham, Bradninch, and Cullumpton, are also considerable towns near this line; which commences in the tide-way of the river *Exe* at the town of Topsham, and terminates in the *Tone* river at Taunton bridge; it has a cut of about seven miles to Tiverton, and other short ones to Cullumpton and Wallington. It is provided, that the brick bridges shall not have a rise of more than $2\frac{1}{2}$ inches in a yard on the ascent of the road over them. Two reservoirs are to be made in the valley of the *Culm* river, and two in the

river *Tone* valley. Springs within 2000 yards of the line may be taken, and cuts to any place within five miles may be made by consent of the land owners. The company are authorized to raise 330,000*l.*, the amount of shares being 100*l.* each. We have not been able to learn that any progress is yet made in the cutting of this canal, although one through this line of country has been so long desired, as appears by Mr. *Brindley's* survey for the *Exeter and Up-hill* canal, that was proposed in the year 1769.

GRANTHAM CANAL. A& 33 and 39 of Geo. III.—The general direction of this canal is nearly east, by a crooked course of $33\frac{1}{4}$ miles, in the counties of Nottingham, Leicester, and Lincoln: its eastern end is rather elevated. Its objects are the supply of Grantham and the neighbourhood through its course with coals, lime, deals, &c. and the export of farming products. Nottingham is the 17th British town, with 28,861 inhabitants; and Grantham the 85th, with 7,014 persons; Birmingham is also a considerable town. This canal commences in the *Trent* river, near Holme-pierpoint, (almost opposite the *Nottingham* canal, to the *Trent* canal, and to the town of Nottingham,) and terminates at the town of Grantham; there is a branch of three miles in length to the town of Bingham. From the *Trent* river to Cropwell-bishop, $6\frac{1}{2}$ miles, is a rise of 82 feet; thence to Stainwith-closes, $\frac{2}{3}$ miles, is level; thence to Woolsthorpe point, $1\frac{3}{4}$ mile, is a rise of $58\frac{1}{2}$ feet; and thence to Grantham, five miles, is level: the cut to Bingham is level. This canal, which is through a clayey district, is wholly supplied by reservoirs, of which, one at Denton is 20 acres, and nine feet deep, for supplying the head-level; and that at Knipton for receiving the flood waters of the *Devon* river, was 60 acres, and nine feet deep, and in 1804, the bank or head of this last was raised four feet higher. The company were authorized to raise 124,000*l.*, the old shares being 100*l.* value each, and the new shares (200 in number) 120*l.* each. The tonnage on all goods passing to or from this canal and the *Trent* river is to be $2\frac{1}{2}$ *d.* per ton, and $1\frac{1}{2}$ *d.* per ton per mile for navigating on this canal: manures and road materials to pass toll free, except lime-stone, which is to pay $\frac{3}{4}$ *d.* per ton per mile. The *Newark and Bottesford* canal was at this time (1793) in contemplation to join this near Stainwith; and the tolls for entrance therefrom, or on goods passing into that intended canal, were settled in the first act above. The profits to the proprietors of this canal are limited to a dividend of 8 per cent. per annum, and after 3,000*l.* are collected and deposited as a fund, the above tolls are to be lowered, as much as circumstances will admit. The *Trent* river proprietors are to take certain tolls on goods passing into or out of this canal to the *Nottingham* canal, in consequence of their deepening the river near the entrances to these canals; and goods passing from this canal on the *Trent* are not to be liable to their new rates of 34 Geo. III. unless they pass on the *Trent* canal, to be made under that act above Nottingham.

GRESLEY'S CANAL. A& 15 Geo. III.—The direction of this canal is about N.W., and level, in the county of Stafford: it is situate very near to the grand-ridge on its eastern side. Its objects are the supply of the town of Newcastle under-line with coals from Apedale collieries, and the export of coals from the mines to the west of it, by means of the *Newcastle under-line Junction* canal, which now joins it at each of its ends. This canal was constructed at the sole expence of sir Nigel *Grisley*, bart., who was bound by the act, for 21 years after 1775, to supply the inhabitants of Newcastle with coals at 5*s.* 6*d.* per ton of 2,400*lb.* or $3\frac{1}{2}$ *d.* by the single cwt. (of 120*lb.*); and during the following term of 21 years, their price was not to exceed

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ceed 6s. per great ton. In 1796, the *Commercial* canal was proposed to connect with this canal at each end, as the *Newcastle under-line Junction* afterwards did in 1798.

GRIMSBY CANAL. Act 36 Geo. III.—This canal has a S.W. direction for $1\frac{1}{2}$ mile, in Lincolnshire; it is one of the largest cuts in England, and calculated to admit ships of 700 to 1000 tons burthen. It commences in the tide-way in the *Humber* river near its mouth, and terminates in the spacious wet-dock in Grimsby harbour. The lock to this canal is 126 feet long, 36 feet wide, and the walls are 27 feet high; the cost of it, we are told, was 14,000l. besides the piling for the foundation, although bricks were delivered there at 18s. 6d. per thousand, and stone at 8d. per cubic foot. The depth of water in this canal is 20 feet: it was constructed under the direction of that able engineer Mr. *John Rennie*. In the year 1804, three acres more surface was excavated in addition to Grimsby wet-docks, and the same was re-opened, after a temporary interruption, on the 24th of July.

HAMOAZE RIVER. This river, or rather estuary, has nearly a north course for about nine miles, between the counties of Cornwall and Devon on their southern coast: it is frequented by the largest ships of the royal navy. Plymouth is the 9th British town, with a population of 43,194 persons; Plympton-Earle and Saltash are also considerable towns near this estuary, which commences in Plymouth sound near Cawland bay, and terminates in the river *Tamar* near St. Mellion. Near Warley the *Tavy* river falls into it; and Cat-water, Sutton-pool, and Stone-house creek, are branches from this estuary. In 1767, Mr. *John Smeaton* was consulted about a new bridge and causeway over Stone-house creek. In 1801, it was in contemplation to build a pier from Pinlee point for the better security of ships lying in Cawland bay from the E.S.E. winds. By an act of 45 of Geo. III. 4,000l. of the public money was voted towards cleansing and deepening Cat-water and Sutton-pool; and it is now in contemplation to construct a floating-dock in Sutton-pool capable of holding 100 merchants' ships always afloat.

Hampton Gay and Isleworth Canal. In the year 1792, a canal was proposed, to take a course nearly N.W. for about 60 miles, in the counties of Middlesex, Buckingham, and Oxford; commencing in the *Thames* river at Isleworth, and terminating in the *Oxford* canal at Hampton-Gay. It was intended to effect that junction between the metropolis and the midland canals, which the *Grand-Junction* now accomplishes: it was to pass the chalk hills by a tunnel at Wendover, and to have a cut of three miles to Aylesbury.

HARTLEPOOL CANAL. This is only a very short cut of 300 yards in length, on the coast of Durham, from the sea into Hartlepool harbour: it was cut in the year 1764, at the expence of sir John H. *Duval*, through a solid rock, to the great depth of 19 feet. In 1796, Mr. *Ralph Dodd* proposed, we are told, some improvements of this harbour.

HASLINGDEN CANAL. Act 33 of Geo. III.—The general direction of this canal is nearly north for 13 miles, in the county of Lancaster; it is considerably elevated, crossing the Haslingden and Liverpool branch of the grand-ridge. Its objects are the export of the rich stores of coal, limestone, &c. on its course, and a communication between Manchester and the *Leeds* and *Liverpool* canal. Bury is the 84th British town, with a population of 7,072 persons; Haslingden is also a considerable town. It commences in the *Manchester Boulton and Bury* canal at Bury, and terminates in the *Leeds* and *Liverpool* canal at Church. No

locks are to be built on this line, except by consent of three-fourths of all the millers who occupy the streams of water; it is intended to erect inclined planes. The company are authorised to raise 87,600l.; the amount of a share is 100l. The tonnage upon all kinds of goods which do not pass a lock or inclined plane, $1\frac{1}{2}$ d. per ton per mile; coals, or other mineral products, are to pay 2d., and timber, goods, wares, &c. 3d. per ton per mile, if they pass any lock or plane. Road materials (except for turnpike roads), and all manures, except lime, are to pass free on the levels, and through the locks when water runs waste over their weirs. Passage-boats are to be specially licensed by the company instead of paying tonnage. No wharfage is to be charged at the public wharfs, unless on goods remaining there above three weeks. We do not understand that much progress is made towards the completion of this canal.

Headon and Paul Canal. It is now (1805) in contemplation to form a canal from the *Humber* river at Paul to the town of Headon in Holderness, about three miles in the east riding of Yorkshire: its objects are the supply of Headon with coals and other articles, and the export of agricultural products.

HEREFORD AND GLOUCESTER CANAL. Acts 31 and 33 of Geo. III.—The general direction of this canal is nearly N.W. for $35\frac{1}{2}$ miles, in the counties of Gloucester and Hereford; the middle part of this canal is considerably elevated. Its object is the export of coals from the neighbourhood of Newent, and of the cyder and agricultural products of the country. Gloucester is the 72d British town, with a population of 7,579 persons; and Hereford, the 89th, with 6,828 inhabitants. Newent and Ledbury are also considerable towns on this line. It commences in the tide-way of the *Severn* river at Gloucester, crosses Alney Isle, and another branch of the *Severn* to Lassington, and terminates near the *Wye* river at Byfters-gate in Hereford; it has a short cut to Newent. From the *Severn* to Ledbury the distance is 18 miles, with a rise of $195\frac{1}{2}$ feet; thence to Monkhide is $8\frac{1}{2}$ miles on the summit-level; thence to Withington marsh it is three miles, with a fall of 30 feet; and thence to Hereford, six miles, it is level. Newent cut is level. On this line are three considerable tunnels, that at Oxenhal is 2192 yards in length; at Cannon-Frome is one of 1320 yards; and near Hereford, another of 440 yards in length. Mr. *Joseph Clowes* is the engineer; in July 1796, this canal was finished, from the *Severn* to Newent, and in March 1798, the Oxenhall tunnel was finished, and the navigation extended to Ledbury, and coals were in consequence reduced in price at that town from 24s. to 13s. 6d. per ton! The company were authorised to raise 55,000l. The prices of work in 1794, on this canal, 4d. per cubic yard for stages of 20 to 25 yards of wheeling: wheel-barrows were not used for moving stuff to greater distances than 100 yards; puddling cost 6d. per cubic yard. The rates of tonnage are for coals 2d. per ton per mile; for manures, bricks, and rubble stone, lime or clay, 1d. per ton per mile; corn, meal, hewn stone, hops, wool, and other goods, 3d.: there are also particular rates for certain parts of the canal. The cut across Alney Isle, owing to the tide of the *Severn*, entering it from each end, and dropping its sediment in the middle, is very liable to choak with mud. Springs or streams of water within 3,000 yards of the line may be taken for the use of this canal.

Hereford and Lydbrook. In 1802, it was proposed to construct a rail-way from the *Wye* river near the bridge in Hereford to join the same river again opposite to Lydbrook.

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HEYL RIVER, (or Hale.) The course of this river or rather estuary is nearly south for two miles, in the county of Cornwall, on its north-eastern coast: it commences in *St. Ives* bay, and terminates at the town of *St. Erth*: it is navigable only for small vessels, being almost choaked at the entrance of the bay. In 1766, Mr. *John Smeaton* was consulted on the building of a north-east pier at the entrance of *St. Ives* bay; the spring-tides here rise 26 feet.

HORNCASTLE NAVIGATION. Acts 32 and 40 of Geo. III. —The general direction of this navigation is nearly N.E. for about 11 miles, in the county of Lincoln; it is not much elevated above the sea: its objects are the supply of *Horn-castle* and its neighbourhood with coals, deals, &c. and the export of agricultural products. *Horncastle* and *Tattershall* are considerable towns on this line. It commences in the old *Witham* river near *Tattershall*, and occupies the site of *Dyson's* and *Gibson's* former cut to *Tattershall*, passing that town to *Horncastle* by the course of the *Bain* river. The company were authorised to raise 45,000*l.*, the amount of each share being 50*l.* The dividends are not to exceed 8 per cent.; but after 1000*l.* is accumulated as a fund for contingencies, the tolls are to be lowered, to keep the profits within that limit. The first rates of tonnage are given in *Phillips's 4to. History, Appendix*, p. 24, but these were varied and increased by the last act above. This company purchased the old *Tattershall* canal, and were, by their first act, to contribute jointly with the *Witham* and *Sleaford* companies in the expences, during the next seven years, in improving and deepening the course of the *Witham* between *Lincoln* high-bridge and the *Fosse-dyke* canal, in order to facilitate the passage of goods to and from the *Trent* river, and in consequence, but half the accustomed *Witham* dues were to be paid for goods passing to and from this navigation. In September 1802, this navigation, and the basin at *Horncastle*, were completed and opened.

HUDDERSFIELD CANAL. Acts 33 and 40 of Geo. III. The general direction of this canal is south-west for 19½ miles in *Yorkshire* and *Lancashire*; it crosses the *Grand-Ridge*, at a great elevation, by one of the longest tunnels in this kingdom, in a rocky mountain: its objects are the carrying of coals that are found towards both its extremities, the supply of part of the country with lime, the conveyance of farming produce to the great towns, and the forming of a more direct communication between *Hull* and *Manchester* and *Liverpool*. *Huddersfield* is the 81st British town, with a population of 7268 persons: *Ashton-under-line* is also a considerable town. This canal commences in *Sir John Ramsden's* canal near *Huddersfield*, and terminates in the *Manchester Ashton and Oldham* canal, at *Duckensfield Bridge*, near the town of *Ashton-under-line* (near which the *Park-Forest* canal also joins it). From *Ramsden's* canal to *Marliden* the distance is 7¼ miles, with a rise of 436 feet; thence and through the tunnel to near *Saddleworth* it is 4 miles, and level; and thence to the *Manchester Ashton and Oldham* canal, 8½ miles, is a fall of 334 feet. The lock at the entrance from *Ramsden's* canal is 8 feet wide, this canal being only intended for narrow and long boats. The Tunnel through the *Stannage Hills* near *Marliden* is to be three miles in length, near to which, on the summit-level, the company are authorised to make reservoirs to contain 20,000 lock-falls of water, (each 180 cubic yards), and may make others if these prove insufficient. About the year 1798, that part of the line between *Huddersfield* and *Marliden* was completed and opened; in the same year the head of a large reservoir near *Marliden* broke, and the torrent of water let down thereby did considerable damage to the country below it. The company are authorised to raise 274,000*l.*, the amount of shares being

100*l.* These became greatly depreciated in value, about the year 1800, owing principally, it is supposed, to many of the original subscribers not being able to answer the calls for money, by which the works were retarded, and the canal remained in an unproductive state: the Tunnel under the *Stannage Hill* is now proceeding. The rates of tonnage are from ½*d.* to 3*d.* per ton per mile for different goods, (see *Phillips's 4to. History, Appendix*, pp. 135, 136.) besides which 1*s.* 6*d.* per ton is to be paid extra, on all goods which pass through the tunnel; less lading than 15 tons is not to pass any lock, unless the water runs waste thereat, without consent; no rates are to be taken by *Sir John Ramsden* for the goods which pass between his warehouses at *Huddersfield* and this canal, this company to amend and keep that part of his canal in repair, in consequence, and are to guarantee his tolls not being lessened, taking an average of three years before this canal is cut. This company is also bound not to make any branch or extension of the canal to any other navigation to the eastward; but, in such case, the tolls thereof are to be divided between *Ramsden's*, the *Calder and Hebble*, and *Ayre and Calder* proprietors, instead of being taken by this company.

HULL RIVER. The course of this river is nearly north for about 12 miles, in the *East Riding of Yorkshire*; it is but very little higher than the sea: its objects are the supply of *Beverley* and the adjacent country with coals, deals, &c. and the supply of *Beverley* and *Hull* with farm produce. *Kingston-upon-Hull* (or *Hull*) is the 16th British town, with 29,516 inhabitants; and *Beverley* is the 100th, with 6001 persons. This navigation commences in the tide-way of the *Humber* at *Hull*, and terminates in the *Driffeld* navigation upon the same river at *Aike-beck* mouth. In *Leven* parish (between *Eske* and *Leven-bars*) this is joined by the *Hull* and *Leven* canal.

HULL AND LEVEN CANAL. Acts 41 and 45 of Geo. III. The course of this canal is nearly east for about three miles, in the *East Riding of Yorkshire*; it is in a very low situation; its objects are the supply of *Leven* town, of lime to the country east of it, and the export of the agricultural produce thereof for the supply of *Hull* and *Beverley*. It commences in the *Hull* river, and terminates at *Leven* bridge. Mrs. *Charlotte Bethel* is the sole proprietor of this canal, on which Mr. *John Rennie*, Mr. *William Jessop*, and Mr. *James Creasby* were consulted. This canal was finished some time ago; and the act of last session was for raising the tolls, which were found disproportionate to the expence of its construction and management.

HUMBER RIVER. Act 23 Henry VIII.—This noble river, or rather estuary, has nearly a west direction for about 40 miles between the counties of *York* and *Lincoln*. The tide flows with great rapidity through its whole length, and the depth of water is sufficient for ships of considerable burthen, which trade in vast numbers to the port of *Hull*, and with the numerous eastern rivers which connect with it. *Hull* contains, as above stated, 29,516 inhabitants; and *Barton* is the 96th British town, with 6197 persons. *Grimby*, *Pattington*, *Headon*, and *Burton* are also considerable towns on or near to this river. It commences in the *German Ocean* at the *Spurn Head*, and terminates in the *Ouse* and the *Trent* rivers, at their junction at *Trent-fall*: it is joined at its mouth, near *Tetney*, by the *Louth* river; at *Grimby*, by the *Grimby* canal and docks; at *Kingston-upon-Hull*, by the spacious *Hull* docks and by the *Hull* river; in *Winttingham*, by the *Ancholme* river; and at *Foss-dyke Clough*, near *Flaxfleet*, by the *Market-Weighion* canal. The port of *Hull*, and the accommodations of this river, have been greatly improved, by the constructing of

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wet-docks at Hull; the acts 14, 42, and 45 of Geo. III. having passed for these purposes, the first dock was opened in September 1778. In 1800, the new Humber-dock was proposed, from Myton-gates to Hefsel-gates, on the site of the old ramparts, to form seven acres of water, to which a 50 gun ship may have access from the *Humber*, and 70 sail of ships may lie constantly afloat, to be surrounded in part by spacious warehouses. By the act for the same, 30,000*l.*, in 1000*l.* shares, was to be raised; these shares have since borne a premium of near 50 per cent. The act of the late session was for raising more money to complete this vast undertaking, now in great forwardness. In September 1802, a small dock was begun on the shore of the *Humber* for market and ferry boats; a number of dolphins or floating buoys were, about the same time, placed on the banks of the river. In 1774, Mr. *John Smeaton* was employed to build two light-houses on the Spurn Head, at 300 yards apart, which, in June 1776, were in imminent danger of having their foundations undermined by a great storm: in September 1803, the lowest of these light-houses was burnt down by accident. Coal-ships, passing the *Humber's* mouth for the London market, pay 1*d.* on each chaldron of their cargo, towards the support of these lights. In 1800 it was in contemplation to erect a light-house at Stallingborough, on the south shore of the *Humber*. In 1802 the *Coltingham and Hull* canal was proposed, to connect with this river at Hull; in the same year, the *Keyingham-Level* navigation was proposed to join at Stone-creek. In 1805 the *Headon and Paul* canal was proposed to connect with it at Paul.

IDLE RIVER. The course of this river is nearly west for about 10 miles, in Nottinghamshire: it commences in the *Trent* river at Stockwith, (near to the termination of the *Chesterfield* canal,) and terminates at the town of Bawtry. At half a mile from the *Trent* is Misterton sas or sluice, with an opening of 17½ feet, and two lock-doors 16 feet high, opening towards the *Trent*, to keep the floods thereof out of the low lands through which this river passes. In 1764, Mr. *John Smeaton* was consulted on this navigation and drainage.

INVERNESS AND FORT-WILLIAM CANAL. Acts 43, 44, and 45 of Geo. III.—This grand or *Caledonian* canal, as it is sometimes called, has nearly a south-west direction for 59 miles, in Inverness and Argyle shires, in the Highlands of Scotland; it passes the Grand-Ridge, through a low part thereof, intersected by deep lakes or lochs: its object is a connection between the East and West Seas, by Linnhe Loch and Murray Firth, for large ships drawing near 20 feet of water, and for avoiding the northern voyage by the Orkneys, or through *Pentland Firth*. Inverness is the 63d British town, with a population of 8732 persons. Nairn, Cromarty, and Fort-George are also considerable towns on this line. It commences in the tide-way in Loch *Beaully* at Clachnacarry bafon, and, after passing through two large and two small inland lakes, it terminates in the tide-way in Loch *Eil* at Corpach bafon. From the sea-lock at Clachnacarry to the 2d lock, about ¼ of a mile, it is level, with high water in Loch *Beaully*, and nearly parallel thereto; thence for one mile to the 6th lock is a rise of 45 feet by 5 locks; thence through Lochs Doughfour and Nefs to Fort Augustus is 28 miles, and level; thence to the east end of Loch Oich at the 13th lock, 5½ miles, is a rise of 53 feet by 7 locks; thence through Loch Oich, and the deep-cutting on the grand ridge west of it, is 54 miles and level; at the end of which the lock N° 12, at the east end of Loch Lochy, makes a fall of 19 feet; thence through Loch Lochy to near Tor Castle is 16¼ miles, and level; and

thence to the sea-lock at Corpach, 2¼ miles, is a fall of 79 feet by 10 locks: in all 23 locks, besides the sea or entrance locks. This canal is 110 feet wide at top, 50 at bottom, and 20 feet deep; the locks are 152 feet long and 38 feet wide. At Clachnacarry and at Corpach are bafons, each 400 yards long and 70 yards wide. Twenty-two miles of this navigation is through a surprising fresh-water lake, called Loch Nefs, of ¾ to 1¼ mile in breadth, the middle part being 119 fathoms in depth! and its bottom muddy: this loch and the next never freeze, and it is said that the waters thereof do not corrode iron. Loch Lochy is another large lake, 10½ miles in length, and from ¾ to 1¼ mile in width, and its greatest depth 76 fathoms, through which this navigation passes: it has a secure little harbour, 200 fathoms long and 150 fathoms wide, at its eastern end. Another smaller lake is found on this line, called Loch Oich, 3½ miles long, from ¼ to ½ of a mile wide, and 26 fathoms in depth in the deepest part, its bottom being a soft mud. Loch Doughfour, the remaining one of the four, is 1¼ mile long, about ¼ of a mile wide in its widest part, and about 40 feet deep. The number of swing bridges is 23; there are 5 culverts with 1 to 4 arches each, and an aqueduct bridge of 4 ten-feet arches at Ley Bridge: the deep-cutting near Laggan is to be 45½ feet deep on the summit, and is estimated to cost 11,262*l.* New courses are required to be cut for the river Spean, and at Fort Augustus for the river Nefs; the steep hills adjoining, rendering it necessary for the canal to occupy the old bed of the river for some distance in those places. A large weir is to be made at the east end of Loch Doughfour, to hold up its waters to the level of Loch Nefs, and several smaller weirs are to be made. Loch Oich is to be deepened 1540 yards in length, at the expence of 11,550*l.* This canal is most amply supplied with water on the summit, not only for the lockage, but for the working of mills out of the different pounds, which will doubtless hereafter prove of immense advantage to the country. In 1774 Mr. *Watt* was employed to survey this line, who estimated a 12 feet deep canal, in the place of the present one, to cost 164,031*l.*, exclusive of the land. In 1801 Mr. *Thomas Telford* was employed by Government to survey the canal above described, assisted by Mr. *Murdoch Downie*, very full particulars of which will be found in the *Reports*, printed by order of the house of commons 14th June 1803 and 10th of April 1804; in which Mr. *William Jessop's* estimate, amounting to 474,531*l.* (exclusive of 23,000*l.* for land and mooring-chains) is given; and walled locks are recommended, on account of the loss of time in filling the chambers of those unwalled. By the first act above, 20,000*l.*, by the next 75,000*l.*, and by the last 50,000*l.* of the public money were granted, for carrying on this great work, under the direction of Mr. *Thomas Telford*. In October 1804, seven miles in length next Inverness were digging, and the entrance bafons were in hand. In August 1805, the new channel for the river Nefs was cutting, the first lock new Inverness was building, 1000 men being employed at this end. It is proposed to place mooring-chains on the shores of Lochs Nefs and Lochy, on account of their being too deep for good anchorage. On Loch Nefs government have had a galley of 37½ tons burthen since 1727, in which period, to 1803, five of them had been worn out: the worm so fatal to wood in some waters is not troublesome here. At Inverness the spring tides rise 11 to 15 feet, and the neap tides 7 feet; at Fort William they rise 12 and 5 feet. Cromarty Bay in Murray Firth, about 18 miles east of the beginning of this canal, was surveyed by Mr. *Thomas Telford* in 1801; the spring tides here rise 14 or 15 feet, and the two piers of this harbour appear to offer a safe retreat for ships, secure from

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every wind, and where warehouses are only wanting for the accommodation of a large fleet.

ITCHING RIVER. Acts 16 and 17 of Cha. II., and 7 and 35 of Geo. III.—The general direction of this navigation is nearly north, for about 14 miles, in Hampshire; it is but little elevated above the sea; its objects are the supply of Winchester with coals, deals, &c. and of Southampton with flour and other agricultural products, and the trade between these towns. At Northam it is joined by the *Southampton and Salisbury* canal. Southampton is the 68th British town, with a population of 7913 persons; and Winchester the 103d, with 5826 persons. It commences in the tide-way in *Southampton Water* near Southampton, and terminates at Winchester. This navigation is the sole property of *James D'Arcy, Esq.*; and he and his predecessors were the sole carriers, or nearly so, thereon, until 1795, when commissioners were named, in the above act, for fixing rates of tonnage, on payment of which it is in future to be a free navigation. It was intended to widen the channel between Woodmill and the Roman ditch, and to erect pound-locks where necessary.

IVEL RIVER. Act 30 Geo. II.—The direction of this river is nearly south, for about 11 miles, in the county of Bedford; it is not very greatly elevated; its objects are the supply of the towns of Biggleswade, Shefford, and the adjoining country, with coals, deals, &c. and the export of farm produce. It commences in the great *Ouse* river at Tensford, and terminates at the town of Shefford. On the lower end of this navigation, sluices with separate and moveable upright planks instead of gates are in use, as before mentioned. Soon after the passing of the act, the navigation was completed to Biggleswade; but the remainder of the distance to Shefford, $5\frac{1}{4}$ miles, has not yet been made navigable, for want of money. In the present year (1805) Mr. *Benjamin Bevan* was employed to survey and estimate the expence of this part, which he states at 5900l.; the rise about 26 feet; to be effected by 5 locks; the toll on this distance is to be 1s. 6d. per ton. It is stated that the part of this navigation below Biggleswade has, in the last seven years, produced a net 400l. per annum, towards the reduction of the debt at first incurred. Several years ago the *Biggleswade and Heriford* canal was proposed to join this river at Biggleswade.

IVELCHESTER AND LANGPORT CANAL. Act 35 Geo. III.—The direction of this navigation is nearly east for about 7 miles in the county of Somerset: it is not much elevated: its objects are the import of coals and export of farming products; Langport and Ilchester, or Ivelchester, are considerable towns; it commences in the *Parret* below the town of Langport, and terminates at the town of Ilchester, following the course of the *Yeo* river part of the way, and the remainder by a canal; the company were authorized to raise 8,000l., the amount of shares being 50l. each: half-mile stones are to be erected on this navigation.

KENNET RIVER. The course of this river is nearly east for about 20 miles in the county of Berks, it has a considerable elevation: its objects are the supply of Newbury, the export of farming products, and forming part of the most direct communication between London and Bath and Bristol; Reading and Newbury are considerable towns. It commences in the *Thames* river about a mile below Reading, and terminates in the *Kenet and Avon* canal a little above Newbury; on this navigation unvalled locks were very early in use; in Feb. 1800 it was proposed to improve this navigation through the borough of Reading. This company has given notice that as carriers, they will not be answerable for the damage goods may sustain by fire or unavoidable accidents. Immense beds of Peat are found near Reading, which is used for considerable distances as a manure.

KENNET AND AVON CANAL. Acts 34, 36, 38, 41, and 45 of Geo. III.—The general direction of this canal is nearly east for $55\frac{1}{2}$ miles in the counties of Somerset, Wilts, and Berks. The middle part is considerably elevated, and crosses both the western and eastern branches of the grand-ridge, the part between these points, crossing the heads of the valleys which fall to the southern coast, while the ends are in those vales falling to the *Bristol Channel* and the *Thames*; its objects are a communication between Bristol, Bath, and London, and the supply of the country west of Hungerford with coals from the mines connected with the *Somersetshire Coal* canal, which joins at Monkton Combe; at Widford it connects with the *Dorset and Somerset* canal, and at Semington with the *Wilts and Berks* canal. Bath is the 12th British town, with 32,200 inhabitants; Devizes is the 69th, with 7,909 persons; Bradford the 78th, with 7,302 persons; and Trowbridge the 104th or 105th, with 5,799 persons; Melksham, Hungerford, and Newbury, are also considerable towns on or near this canal. This canal commences in the *Avon* river at Dole-Mead in Bath, and terminates in the *Kenet* river a little west of Newbury; the branches that were at first proposed to Calne and Chippenham, have been superseded by the *Wilts and Berks* canal, and its branches. From the *Avon* to near Bathampton $\frac{1}{4}$ of a mile is a rise of $56\frac{1}{2}$ feet; thence to Trowle bridge, $10\frac{1}{2}$ miles is level; thence to Devizes, $9\frac{1}{4}$ miles, is a rise of $30\frac{1}{2}$ feet; thence for 20 miles along the summit-pound (and through the tunnel of $2\frac{3}{4}$ miles, at first proposed) to Crofton; thence to Hungerford is six miles, with a fall of 104 feet; and thence to the *Kenet* near Reading, 9 miles, is a fall of 72 feet. By the second act, the company were authorized to raise a part of their summit-pound at its eastern end, so as to pass the summit by a moderate deep-cutting instead of the tunnel above mentioned, and to supply the new summit with water by a large steam-engine. This canal is calculated for 50 ton boats; at Trowbridge there is a basin 129 yards long and 60 wide, and another between Lycombe and Widcombe. There is a considerable deep-cutting near Burbage: there are two large stone aqueduct bridges over the *Avon* river, one called Dundas, the other is at Avon-cliff. Progress was first made in completing parts of this canal at its eastern end, and in October 1798, the same was opened from Reading to Hungerford; in July 1799 the same was opened to Great Bedwin, near the beginning of the summit: in May 1801, the other end of the line was opened from Bath to Devizes. The company were authorized to raise 810,000l. besides a farther sum by the last act; the original shares were 120l. each, but a great number of defaulters appeared among the subscribers, (no less than 450 shares it was said) and those remaining being called on for 17l. 4s. $7\frac{1}{2}$ d. on each, made the amount of these old shares 137l. 4s. $7\frac{1}{2}$ d. each, before the act of 41 Geo. III. restrained any further calls on their shares, and created a new set of shares of the amount of 60l. each. The shares of several discontented proprietors were directed to be purchased. This canal passes through Sydney-gardens near Bath, which are laid out and appropriated to pleasurable parties like our Vauxhall gardens. The rates of tonnage are from 1d. to 2½d. per ton per mile on different goods, and others are fixed for the distance between Bath and Devizes, for which see *Phillips's 4to. History, Appendix*, pages 142 and 143. Mr. *John Rennie* is the engineer, whose superior skill has been shewn in surmounting the great difficulties that have attended the construction of this canal: between Avon-Cliff and Bradford, a single slip cost, it is said, 1000l. repairing. A canal passing through nearly this tract of country was proposed in 1754. The new shares in 1802 bore

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bore a premium, notwithstanding no interest is to be received on them until the line is completed, which was required by the first act to be done in the next year, (1806); we sincerely wish this may be the case. Some years ago it was proposed to extend a branch of the *Basingstoke* canal to join this at Hamptead: in 1796 there was an intention of extending this canal by the side of the *Avon* to Bristol.

KETLEY CANAL. The general direction of this canal, or water-level, is about E.; originally it was about $1\frac{1}{2}$ mile in length, in the county of Salop; it has a great elevation, being within 7 or 8 miles of the grand ridge on its western side; its objects are the conveyance of coals, iron-ore, and lime-stone, the export of heavy iron goods, &c.; it was contrived by Mr. *William Reynolds*, and cut in 1788 at the sole expence of Messrs. *William Reynolds and Co.* and in the year 1793, 1 mile and 188 yards of this level at its east end were sold to the *Shrewsbury* company, and made part of their canal; the price was 840l. half the original cost, with the condition that Messrs. *Reynolds and Co.* should pay 2d. per ton per mile for their goods passing on the *Shrewsbury* canal. This canal now, therefore, consists of about three furlongs of level connecting with the *Shrewsbury* canal, at the head of the Wom bridge inclined-plane, and having at its other extremity an inclined plane of 73 feet perpendicular fall to the Ketley iron-works; this inclined plane was the first that was brought into practice in England for the passage of boats, and in 1789 a copper medal or half-penny was struck to commemorate the same. The boats used hereon are 20 feet long, $6\frac{1}{2}$ feet wide, and 3 feet 10 inches deep, carrying 8 tons; they are floated into a shallow lock at the top of the plane in order to place them upon the wheeled carriage or cradle, which carries them down the plane, after the water in the lock is drawn off into a side-pond, to be pumped up again by a steam-engine into the upper pond, and by which no water is lost out of the upper pond or water level. The inclined plane is double, and a descending loaded boat draws up an empty one or but about one-third laden, by means of strong ropes winding round a barrel at the head of the plane, the velocity being regulated by a brake-wheel; of this plane we have before spoken. Several of these small boats linked together are towed along the level by one horse, and to guide them round the projecting turns of the bank, slide-rails are placed thereon.

Keyingham-Level. In the year 1802, Mr. *William Chapman* made a survey for a navigation, and drainage-cuts, from the *Humber* river at Stone-creek, to Roofs-bridge and Owtwick-carr gate, in the East-Riding of Yorkshire, the estimated expence thereof being 1500l.; the canal was proposed to pass near the town of Keyingham, its objects being the import of coals, &c. and the export of agricultural articles.

KIDWELLY CANAL. The length of this canal is about $3\frac{1}{2}$ miles, in Caermarthenshire, in South Wales, it is the private property of Mr. *Keymer*; it extends from the tide-way at the town of Kidwelly to Mancha coal and lime-works, belonging to Mr. *Keymer*, through whose estate the canal is also cut: its object is the export of lime and coals.

LAGAN NAVIGATION, (Ireland). This is one of the navigations which the Irish parliament have assisted with sums of money, with the view of facilitating the working of the collieries with which it connects; for this navigation and its collieries, various sums of public money were advanced between 1753 and 1770, amounting to 40,304l.

LANCASTER CANAL. Acts 32, 33, 36 and 40 of Geo. III.—The general direction of this canal is nearly S. for $75\frac{3}{4}$ miles, in the counties of Westmoreland and Lancaster; the greater part of its northern end skirts along near the sea-coast, but the southern end is considerably elevated,

crossing within two miles of its termination the Haslingden and Liverpool branch from the grand-ridge. Its objects are, the interchange of the lime-stone of the northern parts, for the coals and cannel of the southern parts of the line, the supply of Lancaster and Preston, &c.: it is to connect with the sea at Glasson Dock by a cut of 4 miles from Galgate on the line of the canal; it crosses the *Loyne* and *Ribble* rivers, but without connecting with them, and it likewise passes under the *Leeds and Liverpool* canal. Preston is the 37th British town with 11,887 inhabitants, Wigan is the 42d, with 10,989 persons, Lancaster the 56th, with 9,030 persons, and Kendal is the 88th, with 6,892 persons; Burton, Garstang, Kirkham, and Chorley are also considerable towns on this line. This canal commences in a bason at Kirkby-Kendal, and terminates in another at West Houghton: to Wharton-Craggs lime-works there is to be a cut of $2\frac{1}{2}$ miles, and another of $2\frac{7}{8}$ miles to Duxbury near Chorley. From the bason at Kendal to Greenhead farm (through the Hincaster or Leven tunnel) is $5\frac{1}{8}$ miles and level; thence to near Borwick, (near the Wharton branch) $9\frac{1}{4}$ miles, is a fall of 65 feet; thence to the south side of the meadows south of Preston is $42\frac{5}{8}$ miles and level! thence to Clayton Green $3\frac{1}{8}$ miles is a rise of 222 feet, and thence to West Houghton $15\frac{5}{8}$ miles is level; the Wharton and Duxbury cuts are level. This canal is 7 feet deep, the boats are 56 feet long and 14 feet wide, carrying 60 tons; and the Glasson branch has a fall of about 52 feet. There are two tunnels, one at Hincaster near Leven's Park of about 800 yards long, and another through the Whittle Hills near Chorley, which proved a most difficult one to execute; at Ashton near Lancaster there is an amazing piece of deep-cutting. At Lancaster there is a most surprising aqueduct bridge 51 feet high, over the *Loyne* river, consisting of 5 arches of 70 feet span each. (See our article BRIDGE.) There are other aqueducts over the *Ribble* at Preston, the Wyre at Garstang, the Beeloo near Bethorn, &c.; and it is passed on an aqueduct 60 feet high near Bark-mill not far from Wigan by the *Leeds and Liverpool* canal. At Kendal the canal is supplied with water by a feeder of 1 mile in length from the river Mint: water from all mines within 200 yards may be taken. The part of the line between Wheelton (near to Clayton Green) and the south end of the long level is at present supplied with a rail way, but we believe only as a temporary measure. Mr. *James Brindley* was employed in 1772 to survey a part of this line, the whole of it was soon after surveyed by Mr. *Robert Whitworth*, and in 1791, Mr. *John Rennie* was employed, who has had the direction of the works upon it, which will redound to his lasting credit. The company is authorized to raise 414,000l. in 100l. shares, and 200,000l. more in shares of 30l. each. In July 1796, the last arch of the Lancaster aqueduct was completed: in September 1805, it was stated that the shares divided 1l. per cent. From Bolton to Lancaster and thence to Preston it was opened in November 1797, and in a few years after the whole of the long level was completed. In June 1803, the Whittle tunnel was completed, and $1\frac{1}{2}$ mile of the rail-way, so that coals passed from West Houghton to Bramber-bridge, and in 1805, the remainder of the rail-way was opened for conveying coals to Preston, Lancaster, &c. At Hest this canal passes along close to the sea beach. The rates of tonnage are, for coals $1\frac{1}{2}$ d. per ton per mile; for lime-stone, slate, salt, bricks, stone, iron-ore, gravel, sand, clay, and manures $\frac{1}{2}$ d. per ton per mile; for lime and iron 1d. per ton per mile, and for timber, wares, and merchandize, 2d. per ton per mile. Coals are not to pass the intended locks N. of Chorley under 2s. 3d. per ton, which is to pass them for 18 miles N. of Chorley. It is provided in the

the *Ulverston* canal act (33 Geo. III.) that coals from this canal may cross the bay of Morecambe to that place without being subject to the sea duty.

LARK RIVER. This river (sometimes called the Mildenhall) has its course nearly S. E. for about 22 miles in the county of Suffolk, after skirting the bounds of Cambridge for some miles. Bury St. Edmunds is the 71st British town, with a population of 7,655 persons; Mildenhall is also a considerable town on the line of this navigation, which commences in the great *Ouse* river at Prick-willow, (about $4\frac{1}{2}$ miles below Ely) and terminates at Bury St. Edmunds. Its objects are the import of coals, deals, &c. and the export of farming products. The lower part of its course is embanked on both sides through the fens. It is generally very short of water in the autumn. In 1789, this river was proposed to be crossed by the *Bishopstortford and Wilton* intended canal; and in 1802 it was proposed to be joined at Bury St. Edmunds by the *Stowmarket and Bury* rail-way.

LEA RIVER. Acts 12 Geo. II. and 7, 19, and 45 of Geo. III.—The general direction of this river is almost north for about 28 miles, between the counties of Middlesex and Essex and in Hertfordshire; it is not much elevated. Its objects are the supply of Hertford and all the surrounding country with coals, deals, &c. and the export of farming products, of which malt from Ware forms a considerable part. At Bromley near Bow it connects with the *Linehouse* canal, and near Hoddesdon it is joined by the *Stort* river. Hertford, Ware, Hoddesdon, Waltham-Abbey, Enfield, and Stratford are considerable towns on or near this navigation. It commences in the *Thames* river at Bow-Creek near the *East-India Docks*, and terminates in the town of Hertford: it has a short cut to the town of Waltham-Abbey. This river, which seems subject to floods, was originally made navigable in some places by weirs and flush-sluiques, or turnpikes. In 1767, Mr. *John Smeaton* calculated one of those sluices to let down $1429\frac{1}{2}$ cubic feet of water per minute on an average, a consumption which greatly injured the mills; the early pound-locks erected on this river were without walled chambers. In 1771 some of the turnpikes were removed and locks built; in 1781, Mr. *Smeaton* was again called in to give an opinion on the very leaky state of the locks. In 1772, and again in 1802, this river was proposed to be joined at Waltham-Abbey by the *London and Waltham-Abbey*, with another junction therewith at Lee-bridge; and in 1792, it was proposed to be joined at Hertford by the *Leicester and London* canal. Several years ago the *Biggleswade and Hertford* canal was proposed to join this river at Hertford. Between Hertford and Ware, the *New River* or aqueduct for the supply of London, has its rise, partly out of the chalk hills, and partly by a feeder out of this river, and pursues its devious course for near 40 miles. This great work was begun by Sir *Hugh Middleton* in 1608; in 1773, Mr. *James Sharp* suggested the making of the *New River* navigable, and continuing it by a level cut to the *Thames* near Reading. In 1803, Mr. *John Rennie* was employed by government to survey the lower part of the course of the *Lea* river, and to construct embankments across, for filling this extensive vale with water in case of an invasion: the gates intended to produce these effects, are vessels that can on the shortest notice be floated to and sunk in their proper places, to stop the water, as before described.

Leatherhead and Thames Rail-way. In 1801, it was proposed to make a rail-way from a bafon to be made on the banks of the *Thames*, in West Moulsey (opposite Sunbury) to the town of Leatherhead in Surry, through the parishes of Walton, Cobham, Stoke-Dawbernon, Little Bookham, Great Bookham and Fetcham.

LEE RIVER, (Ireland.) For improving the navigation

of this river, the Irish parliament between 1753 and 1770, granted 2,000l. of the public money.

LEEDS AND LIVERPOOL CANAL. Acts 10, 23, 30, and 34 of Geo. III. The general direction of this canal is between N. E. and E. by a very crooked course of 130 miles in the counties of Lancaster and York; it crosses the grand-ridge by a tunnel, near Colne, and at Red-Moss and Aspule crosses the Haslingden and Liverpool branch of the grand-ridge. Its objects are a communication between the ports of Liverpool and Hull, the export of the immense stores of coals, cannel, and lime-stone, that are found on parts of its course, and the supply of the great towns thereof with the agricultural products of the intermediate country. At Brier's-mill it connects with the *Douglas* navigation (now belonging to this company, by a purchase under 23 Geo. III.); near Bark-mill not far from Wigan it crosses the *Lancaster* canal (but is 60 feet above it on an aqueduct-bridge.) At Church it connects with the *Haslingden* canal, at Skipton with *Thanel's* canal, and at Windhill with the *Bradford* canal. Liverpool is the 4th British town with 77,653 inhabitants; Leeds is the 8th, with 53,162 persons; Blackburn is the 36th, with 11,980 persons; Wigan is the 42d, with 10,980; Bradford is the 95th, with 6,393 persons, and Hunslet the 104th or 105th, with 5,799 persons; Ormskirk, Chorley, Burnley, Colne, and Skipton are also considerable towns on or near this line; which commences in the town of Liverpool (on the bank of the *Mersey*, but does not connect therewith) and terminates in the *Ayre and Calder* navigation in the town of Leeds; there is a cut to Ighton-hill collieries, another to Mr. Walton's Altham collieries; and provision is made for cuts to be made by the earl of Balcarras and Mr. Shuttleworth between their coal-works and the line. The old bafon at Liverpool is 52 feet above low-water mark in the *Mersey* river, from thence to Newborough, 28 miles, is level; thence to the beginning of the deviation that was last made in the line, near to the town of Wigan, 7 miles, is a rise of 30 feet, by 5 locks, (this last length being sometimes called the *Upper Douglas* navigation, of which it formerly was a part), thence to Bradshaw-hill near Aspule 3 miles, has a rise of 279 feet, by 28 locks, (the *Lancaster* canal being crossed in this distance) thence to the aqueduct over the *Dewer* near Blackburn, $19\frac{1}{2}$ miles, is level; thence to Grimshaw near Blackburn, $\frac{3}{4}$ of a mile, has a rise of $54\frac{1}{4}$ feet, by 7 locks; thence to the end of the deviation at Barrowford near Colne is 24 miles and level; and thence to the beginning of the summit pound near Colne is $\frac{3}{4}$ of a mile with a rise of $67\frac{3}{4}$ feet, by 7 locks. The summit-pound, passing through the Foulridge tunnel, extends to near Thornton, about $6\frac{1}{4}$ miles and level; thence to Holme-bridge near Gargrave is about $7\frac{1}{2}$ miles, with about 150 feet fall, by 15 locks; thence to Gawthorpe-hall near Bingley is 17 miles and level; thence to the junction of the *Bradford* canal is about 4 miles and 100 feet fall by 11 locks; and thence to the *Ayre and Calder* navigation at Leeds is about $12\frac{1}{2}$ miles, and 160 feet fall, by 18 locks: the whole lockage being $840\frac{1}{2}$ feet by 91 locks, which are each 70 feet in length, and $15\frac{1}{2}$ feet in width; the breadth of the canal at top is 42 feet, and it is $4\frac{1}{4}$ feet deep in water. The boats are keel-bottomed, and carry 30 tons of goods, with which they can go down the *Ayre* and *Ouse* as far as Selby; between Leeds and Wigan, 100 flatts of 42 tons burthen are employed in the coal and cannel trade, passage-boats also ply regularly on this part. At Leeds there is a fine bafon, and there are spacious warehouses belonging to this company at the north-east corner of Liverpool town, and it was intended in 1801, to construct a new bafon from the North Graving-Dock on this canal, to the top of Plumbe-street, for which

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7000 cubic yards of earth were to be excavated, and the whole to be lined by 1200 cubic yards of stone masonry. The coals are thrown out of the boats on a branch that proceeds near to the *Mersey*, and slide down a steep bank to a yard by the water side. At Foulridge there is a tunnel of 1030 yards in length, and 23 yards below the highest point of the hill; the soil of which proved so very loose, that only 700 yards could be worked under-ground, the remainder was obliged to be opened from above, from 10 to 20 yards deep, and 20 to 30 yards wide at the top, although it was supported with immense labour and expence by timbers to prevent its falling, until the tunnel arch was formed, which is 18 feet high and 17 feet wide within; it is arched with stone. At Farnley near Burnley, there is another tunnel. At Cottingley below Bingley, and near Gargrave there are considerable aqueduct bridges over the Ayre river, and several lesser ones in different places. Mr. Longbottom made a survey for this canal in 1767, which was revised by Mr. James Brindley in 1768, under whom the canal was begun, after which Mr. Robert Whitworth and Mr. Fletcher were employed thereon. In 1770, the eastern end of the line was completed from Leeds to Holme-bridge, a distance of $33\frac{1}{2}$ miles; about the end of 1794 this was extended to near Foulridge. May 1, 1796, the Foulridge tunnel was completed and the line opened to Burnley. In May 1801, the Farnley tunnel was finished, and the navigation extended to Enfield within $4\frac{1}{2}$ miles of Blackburn; and in July 1801, the Altham branch was opened. The western end of the line was begun as early as the other, and in 1770 the same was opened from Liverpool to the *Douglas* old navigation at Newborough, 28 miles; and on 19th October 1774, the present navigation was completed to Wigan. This company was authorized to raise 600,000*l.* the amount of shares 100*l.* The rates of tonnage are, on lime-stone and other stones $\frac{1}{2}$ d. per ton per mile, on coals and lime 1d. and on all other articles $1\frac{1}{2}$ d. per ton per mile. No wharfage to be taken unless goods remain 6 hours. In September 1805, the company proposed lowering their rates of tonnage on the *Douglas* lower navigation. About the year 1794, a branch of the *Manchester Bolton and Bury* was proposed to join this canal at Red-Moss near Wigan. In September 1802, it was proposed to make a branch from this canal near Wigan to *Bridgewater's* canal at Pennington; also a branch or rail way from it to Low-hall collieries.

LEICESTER NAVIGATION. Acts 31, 34, (for *Asby* Canal) and 37 of Geo. III.—The general direction of the line of this navigation is about south, following nearly the course of the *Soar* river, for 14 miles in the county of Leicester, its Charnwood Forest branch is considerably elevated. Its objects are the supply of Leicester with coals, deals, and general merchandize, the export of coals and limestone from the mines on its branches, and the farming products of the country. On the completion of the *Leicester Union* canal it will become a considerable thoroughfare. At Turn-water Meadow in Cossington, it is joined by the *Leicester and Melton-Mowbray* navigation. Leicester is the 22d British town with a population of 16,953 persons; Loughborough and Mount-Sorrel are also considerable towns on the line. It commences in the basin of the *Loughborough* navigation at that town, and terminates in the *Leicestershire and Northamptonshire Union* canal, at Leicester. From the basin at Loughborough, a rail-way branch of $2\frac{1}{2}$ miles, and a rise of 185 feet, extends westward to a basin at Forest-lane, at the east end of the Charnwood Forest water-level, which level extends $8\frac{1}{2}$ miles to near Barrow-hill, having a side cut of $\frac{1}{4}$ of a mile to Thringstone-bridge, and level. From the west end of the water-level a rail-way extends $\frac{3}{4}$ of a mile further to Clouds-hill lime-works, and there connects or very nearly so

with a branch of the *Asby-de-la-Zouch* canal; there is a short rail-way branch of six chains to Barrow-hill lime-works; the Thringstone-bridge branch is also continued by a rail-way to Coal-Orton in two branches of $1\frac{1}{2}$ mile, and another of $\frac{3}{4}$ of a mile to Swannington-common coal-works. From *Loughborough* basin to the junction of the *Leicester and Melton-Mowbray* navigation it is 3 miles, and level, and thence to the *Leicestershire and Northamptonshire Union* the distance is 11 miles, with a rise of 45 feet. On Charnwood Forest there is a reservoir for supplying the water-level, and a feeder of $\frac{3}{4}$ of a mile in length to convey the water to it. Near the west bridge in Leicester there is a basin for the use of this navigation. Mr. William Jessop was the engineer; in December 1793 the part of the line between Loughborough and Sielby, near Mount Sorrel, was opened, and in February 1794 the remainder of the same to Leicester was opened. The company was authorized to raise 84,000*l.* The rates of tonnage are various: see *Phillips's 4to. History, Appendix*, p. 12. On the making of the *Asby* canal, with branches to the neighbourhood of the collieries connected with the Charnwood level, the company were allowed 2s. 6d. per ton on all coals dug in Swannington, Coal-Orton, or Thringstone parishes, and carried through Blackfordby, on the *Asby* canal. The company are authorized to make rail-ways to any mines within 2000 yards of the water-level; and are to guarantee the *Loughborough* company a receipt of 2000*l.* per annum, on condition of their taking 1*s.* 6d. or less per ton (but not less than 10d.) for coals passing from Loughborough to the *Trent* river.

Leicester and London Canal. About the year 1792 printed proposals and a plan were circulated, for a canal from the *Leicester* navigation at that town to the *Lea* river at Hertford, a distance of 77 miles; passing Market-Harborough, crossing the *Nen* river near Wellingborough, and connecting with the *Ouse* navigation at Bedford; its professed object, as a rival to the *Grand Junction*, was the forming of the shortest communication between London, Liverpool, Hull, and Lynn, and the intermediate large trading towns, mines, &c.

LEICESTER AND MELTON-MOWBRAY NAVIGATION. Acts 31 and 40 Geo. III.—The general direction of this navigation is nearly E. following the courses of the *Wreak* and *Eye* rivers, for about 12 miles, in the county of Leicester; it is not greatly elevated in any part, its objects are the supply of Melton-Mowbray with coals, deals, &c. and the export of the farming products of the country; it commences in the *Leicester* navigation at Turn-water Meadow in Cossington, and terminates in the *Oakham* canal, at the town of Melton-Mowbray. The company were authorized to raise 40,000*l.* The original rates of tonnage may be seen in *Phillips's 4to. History, Appendix*, p. 13, but these were altered and increased by the late act above, and several regulations made respecting tolls with the *Oakham* company. This navigation was completed in a few years after the passing of the first act.

LEICESTERSHIRE AND NORTHAMPTONSHIRE UNION CANAL. Acts 33 and 45 Geo. III.—The general direction of this canal is nearly S.E. by a crooked course of $43\frac{1}{4}$ miles in the counties of Leicester and Northampton; its middle part is considerably elevated, and skirts along the eastern side and near to the grand-ridge for several miles: its objects are the formation of a junction between London, Hull, and Lynn; the supply of the country through which it passes with coals, deals, &c. and the export of farming products; it is to connect at Northampton with a rail-way branch of the *Grand Junction*. Leicester is the 22d British town, with a population of 16,953 persons, and Northampton is the 85th, with 7,020 persons, Market-Harborough

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is also a considerable place near the line. This canal commences in the *Leicester* navigation in the town of Leicester, and terminates in the *Nen* river at the town of Northampton; there is a cut of $3\frac{3}{4}$ miles in length to Market-Harborough. From the *Leicester* navigation to Fleckney near the Saddington tunnel is $12\frac{3}{4}$ miles, with 160 feet rise; thence to near Great Oxenden $13\frac{1}{2}$ miles are level; thence in $\frac{1}{2}$ of a mile is 50 feet rise; thence the summit-pound extends through Oxenden and Kelmarsh tunnels to near Maidwell, $4\frac{7}{8}$ miles and level; thence to the junction of the North river near Northampton are $11\frac{3}{4}$ miles, with a fall of $197\frac{1}{2}$ feet, and thence to the head of the *Nen* navigation is $\frac{1}{4}$ of a mile and level. The Market-Harborough cut is level. At Gumley there are a basin and warehouses. There are four tunnels on this line, viz. at Foxton, of 1056 yards in length; at Kelmarsh, of 990 yards in length; at Saddington, of 880 yards in length, and at Oxenden, of 286 yards in length. On Oxenden and Kelmarsh brooks are the aqueducts for the supply over the summit-level, but flood-waters alone are to be taken. There are a great number of small aqueducts over the streams which it passes. Mr. *John Varley*, sen. and Mr. *C. Staveley*, jun. are the engineers. In March 1800, the tunnel at Saddington was finished, and the line opened from Leicester to Gumley, a distance of 17 miles; but small progress appears to have been since made with the other three tunnels, and the remainder of the line, intended to form the union. The rates of tonnage on coals and coak are $2\frac{1}{2}$ d. per ton, per mile, but not to exceed 5s. for any distance; for lime, lime-stone, dung, and manure $1\frac{1}{2}$ d. per ton, per mile, but not exceeding 2s. 6d. per ton, on any distance; for live cattle, stones, bricks, tiles, slates, sand, iron-stone, pig-iron, and pig-lead, 2d. per ton, per mile, and for other goods 3d. per ton, per mile; troops and government stores are exempted. Road-materials, and manures (except lime) for the use of the proprietors of lands on the pounds, may also pass the locks when the water runs waste thereat. The towing path may be used as a bridle and drift-way by the owners of adjoining lands. By the first act the company were authorized to raise 300,000l. shares 100l. each; the last act was for varying some parts of the line and amending the former one. About the year 1793, the *Uppingham* canal was in contemplation, and its junction with this canal is provided for in the first act above. In 1803 it was proposed to alter and shorten the branch to Market-Harborough, and to make a feeder from Wistow brook; and in the same year Mr. *Thomas Telford* surveyed the line of country between Gumley basin and Buckby wharf on the *Grand Junction* canal, proposed as a substitute for the southern part of the line to Northampton.

LEOMINSTER CANAL. Acts 31 and 36 Geo. III.—The general direction of this canal is nearly W. by a crooked course of $45\frac{1}{2}$ miles, in the counties of Worcester, Salop, and Hereford; its western end is very considerably elevated; its objects are the supply of Leominster and the country with coals from the Pinfax mines near its eastern end, and the export of iron, lime, and agricultural products: Kingston, Presteign, Leominster, Ludlow, Tenbury, Cleobury-Mortimer, and Bewdley are considerable towns on or near to the line of this canal: it commences in the *Severn* river at Areley near Stour-port, and terminates at the town of Kingston: it has two short cuts to mills near Tenbury. From the *Severn* river to the east end of the Pinfax tunnel it is 3 miles, with a rise of 207 feet; thence through that tunnel, and the Souffrant tunnel to its western end, it is 9 miles and level; thence to the river Rea aqueduct is 1 mile, with a fall of 30 feet; thence to Letwich brook, 7 miles, it is level; thence to Wilton, $4\frac{1}{2}$ miles, is a rise of 36 feet; thence to near Luston, $5\frac{1}{4}$ miles, is level; thence to Leominster, $1\frac{1}{2}$

mile, is a fall of 18 feet; thence to near Kingland are $4\frac{1}{2}$ miles, with 64 feet rise; thence to Milton are $3\frac{1}{2}$ miles, with 37 feet rise; thence to Stanton-park are $2\frac{1}{2}$ miles, with a rise of 152 feet, and thence to Kingston are 4 miles, and level. At Pinfax is a tunnel of 3850 yards, and the other at Souffrant is 1250 yards in length. There are considerable aqueduct-bridges over the Rea river at Knighton, over the Teme at Woferton, and over the Lugg at Kingland: a power is provided in the act for inclined-planes instead of locks, if the same should be found most eligible; springs of water within 2000 yards of the line may be taken. Mr. *Thomas Dadford*, jun. is the engineer. In July 1796 the difficult tunnel at Putnal-field in Souffrant was finished, and in November 1796, near 20 miles of canal, from Mamble coal-works to the town of Leominster were opened, and coals, which before sold there at 1s. 6d. per cwt. were at once reduced to 9d. per cwt. ! On the 1st of June 1797, the entrance of the canal from the *Severn* was opened: since which considerable progress has been made in the works: in May last (1805,) the Pinfax mining company was proposed, for opening new coal and iron mines near that place, on the line of the canal, which was expected to facilitate its completion. The *Leominster* company have been authorized to raise 370,000l. The tonnage rates are too long for our room, they will be found in *Phillips's 4to. History, Appendix*, p. 5 and 6. About the year 1794, the *Welshpool and Leominster* canal was proposed to join this at Woferton.

LIFFEY RIVER, (Ireland). The direction of this river is nearly west, in Dublin county, from the bay of Dublin to the entrance basin of the *Grand Canal* in Dublin city, where also are a Harbour and Docks that have been improved, under Mr. *William Jessop*; the spring tides rise only 13 feet at these dock-gates. In the year 1800 it was proposed to avoid the bar at the mouth of the *Liffey*, by cutting a new channel or canal for ships from Dunleary to Ringstead dock; it was also proposed to make Dalkey sound a safe harbour, and to make a cut from thence to the *Grand Canal* basin; the bill for this purpose was passed by the commons, but was rejected by the house of lords. Ormond bridge, on this river, was carried away by a flood, and in September last (1805,) the corporation of Dublin harbour offered premiums for the best plans for a new bridge at this place.

LIMEHOUSE CANAL. The direction of this canal is about N.E. for $1\frac{1}{2}$ mile, in the county of Middlesex; it is but little elevated above the level of the sea; its object is to shorten the navigation between the *Lea* river and the port of London, by avoiding the circuit round the Isle of Dogs; it commences in the river *Thames* near Limehouse church, and terminates in the *Lea* river at Bromley near Bow, having a rise of $17\frac{1}{2}$ feet. This canal was cut at the expence of the city of London, in an early part of the present reign, and its locks, which are of wood, and its other works, form a great contrast to the improved locks and appendages of modern canals. In 1773 a cut from the intended *London and Waltham-Abbey* canal was intended to join this near Limehouse church.

LIMERICK CANAL, (Ireland). This canal was cut near 40 years ago from the town of Leitrim to a morass within a short distance, for the purpose of bringing turfs, to supply the town of Limerick with fuel, and which by their cheapness superseded in a great measure the use of coals, which coming by a long coast-ways navigation were very dear.

Lisheard Canal. In 1777, Mr. *Edmund Leach* proposed a canal, or rather a system of water-levels and inclined-planes, from the tide-way in the *Looe* river, at Sand-place in Morval to Bark-mill-bridge, in St. Clear; this was proposed to be accomplished by two levels of 9 and 6 miles in length

length, (one of which, in its serpentine course, went within $\frac{1}{2}$ a mile of Lifford town,) connected with each other and the river below by two inclined planes for boats, the principles of which have been already explained; the estimate was 17,500*l*. The objects of this navigation were the carrying up of lime and sea-sand for manure, and exporting corn, &c.

Liverpool and Runcorn. About the year 1771, a survey was made by Mr. James Brindley, for a canal from the town of Liverpool upon one level, to cross the Mersey at Runcorn-gap, by an aqueduct bridge, and join the duke of Bridgewater's canal; besides the great width of the Mersey at this place, a tide, which rises 14 feet, was also to be encountered.

Llandoverly and Llanelli. In September 1801, notices were given for an intended canal from Spitty in the parish of Llanelli, on the Burry river, through Llangennech, Llanedy, Landebye, Llandingar, &c. to Llandoverly or Llanyneddyvi, in the county of Caermarthen in South Wales. The objects of this canal were since accomplished by the *Caermarthenshire* rail-way, over nearly the same tract of country.

London Canal. In July 1802, a survey was made for a canal, about in a west direction, for near 7 miles, in the county of Middlesex: commencing in the *London Docks*, (and thereby communicating with the *Thames* river,) to pass West's-gardens, the mount in White-chapel road, and Bethnal-green New road, across Hackney road, through Middlesex-place across Kingsland road, near Iron-monger's alms-houses, to pass north of Lady Lumley's alms-houses at Hoxton, across the city road below the turnpike-gate, across Goswell-street, south of Goswell-place, across St. John's-street, north of Taylor's brew-house, under the field south of the New-river head, over the valley at Bagnigge-wells, across Gray's Inn-lane at the west corner of the Welsh Charity-school, across the New road to the east corner of Bedford nursery, across Tottenham court road between St. James's burying-ground and the New-river reservoir, past the fronts of the Artichoke and Queen's-head public houses, and across the Edgeware road to the basin of the *Grand Junction* canal at Paddington, the rise in this distance being about 90 feet. The great number of bridges required, the passing of the field near Islington full of water-pipes in all directions, belonging to the New-river company, by an arch under the same, and a large embankment or aqueduct bridge near Bagnigge-wells, were difficulties in the way of this project, but to which the subscription for shares (which almost immediately filled to the amount of 400,000*l*.) would have been equal; had not the inability of the *Grand Junction* company to furnish the water necessary for the lockage, and the opposition of several powerful land owners, on account of its making some alterations necessary in their building projects, frustrated the scheme altogether for the present. The western branch of the *Grand Junction*, of which we have before spoken, was in contemplation at the time this canal was intended, and water was proposed to be obtained thereby from the *Thames* for this canal, the Colne millers having it unfortunately in their power, to prevent any being obtained from that river; Mr. John Rennie, who gauged the stream of the *Thames*, in the dry summer of 1794, at Laleham (which is after it has received the main streams of the Colne), found 1155 cubic feet of water to pass in one second of time, which is 184 times what would be required to be taken from this river higher up near Great Marlow, and brought by the *Grand Junction* level branches, for supplying the lockage of this canal, supposing 60 locks containing 1055 cubic feet each, to be used daily. After the

opposing interests were found too strong to leave any prospects of carrying this canal, a faint effort was made to accomplish a rail-way, through nearly the same line, but with no better success. In 1773, Mr. Robert Whitworth made a survey for the city of London, and recommended a line of canal from the *Lea* river at Lee-bridge, to near the same spot which the *Grand Junction* basin now occupies at Paddington: it was intended as branches east and west of the *London* and *Waltham-Abbey* canal.

London Lynn and Norwich. In the year 1785, Mr. John Phillips published a thin 4to. treatise, to endeavour to call the public attention to a canal between the *Ouse* river at the port of Lynn, and the *Thames* river at Limehouse in London, with a branch to the *Tare* river at Norwich. It appears that Mr. P. travelled through the proposed tract of country in 1779 and 1780, but took no levels or other necessary particulars, yet ventures to state, that he could execute this canal, 36 feet wide, and $4\frac{1}{2}$ feet deep, for 200,000*l*. And it is held out, that 28,000 oak Trees, to be planted on the banks of this canal, will, in 50 years, repay all its expences within 60,000*l*. In 1802 we are told that Mr. Ralph Dodd made an effort to revive this or a similar scheme, and wished to denominate it the North London Canal.

London and Waltham Abbey. In the year 1773, at the instance of Mr. James Sharp, Mr. Robert Whitworth was employed by the city of London to survey the line for a canal between the centre of the quarters in Moorfields, London, to the river *Lea* at Waltham-Abbey; a distance of 14 miles, almost in a north direction in the counties of Middlesex and Hertford; this line was to be level (and about 30 feet above spring-tides in the *Thames*;) there was a cut of $\frac{3}{8}$ of a mile, and 33 feet fall proposed to the *Lea* river at Lee bridge, and another of $4\frac{3}{8}$ miles to Wellin's Farm near Paddington, with 49 $\frac{3}{4}$ feet rise; nearly to the same level as the *Grand Junction* basin now has; also another cut of near 2 miles to the *Limehouse* canal near the church, with a fall of 42 feet (to the common neap tides in the *Thames*). The width was to be 60 feet, and depth $4\frac{1}{2}$ feet; in Moorfields and near Holywell Mount, large basins were intended; between Stamford-hill and High-croft a very large embankment was necessary, another at Hackney brook, and another at St. Pancras brook; at Ponder's end was to be a deep-cutting to avoid the houses; 15 turnpike road-bridges, and 22 road-bridges of lesser size were necessary, the whole expence Mr. Whitworth estimated to be 98,229*l*. In 1802, this or a similar scheme seems to have been in contemplation, but to join the *Thames* near Bell-wharf in Shadwell instead of the *Limehouse* cut.

LOOE RIVER. The general direction of this navigation is nearly N. for about $3\frac{3}{4}$ miles, on the south coast of Cornwall, it commences at the sea near East Looe, (which is a considerable town,) and terminates at Morval bridge, near which, at Sand-place, it was, in 1777, proposed to be joined by the *Liskeard* canal; its objects are the carrying up of coals, and sea-sand as manure, and the export of agricultural products.

LOUGHBOROUGH NAVIGATION. Act 16 Geo. III.—The general direction of this navigation is nearly S. for about 9 miles, following the course of the Soar river, except in the last mile, which is a new cut; it is but little elevated; at the basin, 300 yards from its south end, it is joined by the line of the *Leicester* navigation and by the Charnwood-Forest rail-way branch belonging thereto. It commences in the *Trent* river (nearly opposite to the *Erewash* canal, and near to the *Trent* canal) near Sawley, and terminates at the Rushes near the town of Loughborough, which is a

considerable place; its objects are as various as the trade of the *Trent*, and the wants of Leicester and other great towns; it forms also part of the line of communication which the *Leicestershire and Northamptonshire Union* canal is to open. On the making of the *Leicester* navigation, that company guaranteed the amount of the tolls on this, to amount to 3000*l.* annually, on condition of no more than 1*s.* 6*d.* per ton on coals or less than 10*d.* being taken by this company.

LOUTH NAVIGATION. The general direction of this navigation is nearly S.W. for 14 miles in the county of Lincoln, it is but little elevated above the sea; its objects are the supply of Louth, and the adjacent country with coals, deals, &c. and the export of farming produce; it commences at the sea-lock and ebb-gates in Titney Haven (at the mouth of the *Humber* river), and terminates at the town of Louth. From Titney Haven to the Louth river near North Cockerington $9\frac{3}{4}$ miles is level, and but little higher than low-water mark, being a new cut through a low fenny country; thence to Kiddington old mill, $2\frac{3}{4}$ miles, is 24 feet rise; thence to the Leather-mill meadow, $\frac{3}{8}$ of a mile, is $11\frac{1}{2}$ feet rise; thence to Louth is $\frac{3}{4}$ of a mile with 21 feet rise. Mr. *John Grundy* made a survey of this line, which was revised by Mr. *John Smeaton*, in 1760, the estimate of expence being near 15,600*l.* See *Smeaton's Reports*, vol. i. p. 23.

LOYNE RIVER. The general direction of this river (sometimes called the *Lune*) is nearly N.E. for about 7 miles in the county of Lancaster; the tide flows through its whole length; its object is the foreign trade of Lancaster, particularly in cabinet-maker's wares, a branch of the *Lancaster* canal is to connect with it at Glasson, where a spacious wet-dock is intended. Lancaster is the 56th British town with 9,030 inhabitants; this river commences in the Irish sea at Sunderland point, and terminates at Lancaster old bridge, some distance below Mr. *Rennie's* famous aqueduct bridge over this river. It appears, that in the year 1799, 52 vessels cleared out of this river for the West Indies with 11,669 tons of goods in more than 90,000 packages, worth $2\frac{1}{2}$ millions sterling. In October 1799, it was in contemplation, to construct a spacious dock at Thornbush for large ships, with a canal from thence of 6 miles in length through Glasson-dock, and nearly up to the town of Lancaster, to be wide and deep enough for the largest vessels that trade to that place.

LYNN RIVER. The general direction of this river (sometimes called the *Lenne*, the *Nar*, or the *Setchy*) is nearly S.E. by a crooked course of about 15 miles in the county of Norfolk; it is not greatly elevated in any part; its objects are the import of coals, deals, &c. and the export of farming produce; Lynn is the 50th British town with a population of 10,096 persons, Narford is also a considerable town; it commences in the Great *Ouse* river near the harbour of Lynn, and terminates at the town of Narford.

Macclesfield and Leek. In 1796, it was said, that a canal between these places was in contemplation, with extensions thereof to the Staffordshire potteries, in all 29 miles, on which no locks were to be used. Macclesfield is the 61st British town with 8,743 inhabitants.

Maidenhead and Isleworth. In the year 1770, Messrs. *James Brindley* and *Robert Whitworth*, were employed by the city of London, to survey the line of a canal from the *Thames* river at Isleworth, to the same river again below Bolter's-lock near Taplow-mill, about 1 mile above Maidenhead-bridge, and at the lower end or termination of the 3d district of the *Thames and Isis* navigation; the length of this line is $19\frac{3}{8}$ miles with a rise of $71\frac{1}{2}$ feet. The canal was proposed to be 50 feet wide and 4 deep, with cuts to the *Thames* at Windsor, and near Lakeham; in the first 5 miles

7 locks were to be built, and one in the remaining distance; the estimate of expence was 47,885*l.* A bill for this was brought into parliament, but the opposition of the land-owners proved fatal to it; although, as appears, by an accurate measurement and section of the river between these two points made by the above engineers (see *Gentleman's Magazine for March 1771*), that the length of the river-navigation is $37\frac{3}{8}$ miles in this distance, and greatly obstructed by shallows, some only $2\frac{1}{2}$ feet deep in dry seasons. In the year 1791, this scheme was revived, and in 1794, Messrs. *Robert Whitworth* and *Robert Mynae* were employed to revise this line; their design has 12 miles of level at the upper end, and 10 of them straight; the canal to be 5 feet deep. The tolls at first proposed were $\frac{1}{2}$ *d.* per ton per mile on all articles; out of this revenue, it was proposed to improve the river navigation between Mortlake and Bolter's-lock: and to raise the necessary sums on life annuities, so that after a fund was established for repairs and management, the canal might at length become free for the public use. At Bolter's lock the *Reading and Maidenhead* canal was proposed to join this canal, by which the navigation from London westward would have been amazingly shortened and improved.

MANCHESTER ASHTON AND OLDHAM CANAL. Acts 32, 33, 38, 40, and 45 of Geo. III.—The general direction of this canal is nearly E. for about 7 miles in the counties of Lancaster and Cheshire; its eastern end is considerably elevated; its objects are the supply of Manchester and Stockport with coals, cannel, stone, lime, &c. and forming part of the intended direct communication between Liverpool, Manchester, and Hull, by means of the *Huddersfield* and other canals; by means of its Duckenfield branch it communicates with the *Peak-Forest* canal. Manchester is the 2d British town with 84,020 inhabitants, Stockport is the 29th with 14,830 persons, and Oldham the 35th with 12,024 persons, Ashton is also a considerable town, and the country round about is full of inhabitants. This canal begins in the *Rochdale* canal near Piccadilly street in Manchester, and terminates in the *Huddersfield* canal at Duckenfield bridge, in the parish of Ashton underline; from Duckenfield bridge is a branch of $\frac{1}{4}$ mile in length, over an aqueduct bridge on the Tame river at Walk-mill, into Duckenfield, there to join the *Peak-Forest* canal. There is a branch of 1 mile to Ashton town, another of $3\frac{3}{4}$ miles to New Mill in the parish of Oldham (but $2\frac{1}{2}$ miles distant from the town), from which last at Boodle-wood a branch proceeds over Water-Houses aqueduct on the Medlock brook, to Park collieries at Stake-Leach near Hollingwood, also in the parish of Oldham; from Droylsden, a branch of 6 miles proceeds to the end of the town of Stockport in Heaton-Norris parish, and from this last, a branch of 3 miles proceeds in a N.E. direction to Beat-Bank in Denton. The line has a rise of 152 feet between the *Rochdale* and *Huddersfield* canals. This canal is 33 feet wide at top, 15 feet at bottom, and 5 feet deep in water, except the summit pound which is made 6 feet deep to act as a reservoir; the locks are 80 feet long, and the boats carry 25 tons; there are three considerable aqueducts at Duckenfield, Ancoats, and at Water-Houses. This company were authorized by their first 4 acts to raise 170,000*l.*, and a further sum by the late act; amount of shares 100*l.* The line of this canal was completed between Manchester and Ashton about the end of the year 1796, and in January 1797, the Stockport branch was opened; some of the works on this canal suffered by a flood in August 1799. The rates of tonnage are given in *Phillips's 4to. History, Appendix*, p. 21. In 1802, we were told, that the shares in this concern were 20*l.* below par.

MANCHESTER BOLTON AND BURY CANAL. Acts 31, and

and 41 of Geo. III.—The general direction of this canal is N.W. for about 11 miles in the county of Lancashire; its northern end is considerably elevated; its objects are a communication between the great manufacturing towns of Manchester, Bolton, and Bury, and the carriage of coals and other articles for their supply, and forming part of the line of communication between Manchester and the *Leeds and Liverpool* canal. Manchester is the 2d British town with 84,020 inhabitants, Bolton is the 32d with 12,592 persons, and Bury the 84th with 7,072 persons. This canal commences in the *Mersey and Irwell* navigation near the junction of Medlock brook (by which it communicates with *Bridge-water's* canal near the beginning of the *Rochdale*) at Manchester, and terminates at the town of Bolton, it has a branch of 4 miles in length to the *Haslingden* canal at the town of Bury. From the *Mersey and Irwell* navigation, is a rise of several locks to the basin in Salford parish: thence for about 4 miles is level; in the next 3 miles are 12 locks, the remainder of the line is level, including the branch to Bury; the whole rise is 187 feet. Previous to 1794, this canal was begun, and several locks were built for narrow boats, but on account of the branches connecting with wide canals which were proposed about that time, these were pulled up and rebuilt, and the canal widened, including some expensive deep-cutting and embanking; a want of skill or care appeared also, we are told, in the setting out of this canal by cutting deep through rocky ground which might have been avoided. There are two aqueduct bridges over the Irwell at Clifton-Hall and near Stocks, and one over the Leven at Long-fold, these are said to be 20, 16, and 10 yards high; the canal was, in 1799, supplied by a feeder from the Irwell at Bury, but in 1802, a reservoir and feeder also was found necessary in Radcliffe parish. In 1797, this canal was completed to Bolton, except the locks to connect with the *Mersey and Irwell* navigation; on the 17th of August, 1799, a great flood happened, which carried away the lower bank of this canal for 100 yards together on the summit-level, and another breach therein also happened, by which the navigation to Bolton, &c. was some time interrupted. This company were authorized by their first act to raise 97,000l., and a further sum by the late act. The rates of tonnage are for coals, lime-stone, stone, bricks, clay, &c. 2d. per ton per mile, if they pass a lock; but all these, except lime-stone, are to pass on the levels for $\frac{1}{2}$ d. per ton per mile; and when the water runs waste at the locks, lime-stone is also to pay only $\frac{1}{2}$ d. on any part; the tonnage at the entrance of the *Mersey and Irwell* navigation is also regulated by the first act. Passage-boats from Bolton to near Manchester are established; but when water has been scarce, the passengers have been required to walk past the locks to another boat on the lower pound to avoid the waste of lockage-water. About the year 1794, it was in contemplation to make a branch westward from Bolton, to connect with the *Leeds and Liverpool* canal at Red Moss near to Wigan, and to make a grand extension of the Bury branch eastward to the *Calder and Hebble* navigation at Sowerby-bridge, passing the grand-ridge between Littleborough and Rippondale by a tunnel of 5 miles in length! after passing a shorter tunnel of $\frac{1}{2}$ a mile at lower Lomax near Heyford. In 1796, it was proposed to extend a branch from the basin in Salford parish to Oldfield-Lane in that town; and, in 1799, it was in contemplation to build an aqueduct bridge over the Irwell, and connect this canal with *Bridge-water's* canal, instead of locking down into the *Mersey and Irwell* navigation.

MARKET-WEIGHTON CANAL. Act 12 Geo. III.—The general direction of this canal is nearly N. for about 11 miles in the East Riding of Yorkshire; it has but little elevation

above the sea; its objects are the conveyance of coals, deals, &c. to Market-Weighton and the surrounding country, the export of farming products, and the better drainage of the fen lands through which it passes; it commences in the tide-way in the *Humber* river (opposite to the *Trent* river) at Folydyke-Clough, and terminates near Market-Weighton. It has a sea-lock next the *Humber*, from whence it is level to within a short distance of its northern end, where is a rise of 4 or 5 locks. Mr. John Smeaton was consulted on this line of canal and drainage, in 1765, at which time a branch of this canal to Pocklington was in contemplation; for the rates of tonnage, see *Phillips's 4to. History*, p. 270. This navigation was completed soon after the passing of the act.

Mawgan Canal. About the year 1775, a narrow canal was cut of 6 or 7 miles in length; from Port Mawgan near Trenance on the N.W. coast of Cornwall, to within 3 miles of St. Columb Major, it was intended for bringing up coals and sea-sand for manure, and for carrying down china-stone and clay, substances found in St. Dennis and St. Stephens, and used in the Staffordshire potteries; but after several of the adventurers were ruined, the scheme was totally abandoned.

MEDINA RIVER. The direction of this navigation is south, and nearly straight for $4\frac{1}{2}$ miles, in the Isle of Wight in Hampshire; the tide flows through its whole length; its object is the supply of Newport and the central parts of the island with coals and other articles; it commences at Cowes harbour (opposite *Southampton Water*), and terminates at Newport bridge.

MEDWAY RIVER (*lower district*.) Acts 32 and 42 of Geo. III.—The general direction of this navigation is nearly S.W. for about 27 miles by a bending course in the county of Kent; it is but little elevated in any part; its objects are the import of coals, deals, and other articles, and the export of Kentish-Rag lime-stone, fullers-earth, farming-produce, &c. near its northern termination, it connects with the east Swale or tide-way passage, of about 15 miles in length south of Sheppy island, connecting with the *Thames* near Whitstable; and, at Nicholson's ship-yard in Strood it is joined by the *Thames and Medway* canal. Chatham is the 46th British town with a population of 10,505 persons, Maidstone is the 66th with 8,027 persons, and Rochester is the 90th with 6,817 persons, Sheerness, Queenborough, and Milton, are considerable towns on or near this navigation, which commences in the river *Thames* at the Nore, and terminates in the upper *Medway* navigation at Maidstone bridge. Over this river at Rochester, there is a stone bridge of 11 arches and 550 feet long. At Chatham is a very considerable naval arsenal. The powers of the above acts for repairing and levying of tolls, extend no further down this river than from Maidstone to the tide-way at Aylresford bridge.

MEDWAY RIVER (*upper district*.) The general direction of this part of the river is S.W. for about 12 miles in the county of Kent; it is not much elevated in any part; its objects are the import of coals, deals, &c. and export of lime-stone, fullers-earth, farming-produce, &c. besides Maidstone, mentioned above, Tunbridge is the only considerable town on this line; it commences in the lower *Medway* navigation and terminates at the town of Tunbridge. In 1802, the *Medway and Rother* canal was proposed to connect with this river at Yalden-lees.

Medway and Rother. In the year 1801, a survey and estimate was made by Mr. Sutherland, for a canal from the *Rother* river intended navigable branch at Small-Hithe, to the *Stour* river at Canterbury (at the S. end of the proposed *Canterbury and Nicholas-bay* canal), with a branch thereof

to the *Medway* river at Yalden-lees, through the counties of Suffex and Kent; its objects were the supply of the interior country with coals and other articles, the export of timber and farming products, and forming a communication between the south coast at *Rye-harbour* and the *Thames* river, &c. Forty-ton boats were intended to be used, and the canal to be 4 feet deep. The summit was found to be about 100 feet above the sea, and nearly 50 miles of the line was to be upon one level.

MENAI STREIGHT. This streight separates Anglesea isle from North Wales, and has nearly a N.E. direction for about 16 miles, through which the tide flows; it extends from Caernarvon bay at Abermenai Ferry to Lavan Sands; Caernarvon and Bangor are considerable towns on this line. In 1801, and 1802, it was in contemplation to build a cast-iron bridge over this streight at Swelly rocks near Porthac-havy Ferry not far from Bangor.

MERSEY AND IRWELL NAVIGATION. Acts 7 Geo. I. and 34 Geo. III.—The general direction of this navigation is nearly east, by a crooked course of 50 miles in the county of Lancaster, and skirting the county of Chester; the first 20 miles being by a most spacious estuary of the *Mersey* river; it is not greatly elevated in any part; its objects are most important, particularly in the immense trade between Liverpool and Manchester, and Hull, also by four different routes across the grand-ridge; the navigations immediately connecting therewith are, at Ellesmere-port in Netherpool, where it is joined by the *Ellesmere* canal; at Weston by the *Weaver* river; at Runcorn-Gap, and again at Manchester (by the *Medlock Brook*), by *Bridgewater's* canal, besides being crossed thereby on Barton aqueduct; at Fiddlers-ferry, and also at Sankey Brook, by the *Sankey* canal; and at Manchester, near the junction of *Medlock Brook*, by the *Manchester Bolton and Bury* canal: besides which, the following commence very near to this navigation, although they do not actually lock down into it: viz. the *Leeds and Liverpool*, at the basin in Liverpool, the *Trent and Mersey*, at Preston Brook, and the *Rochdale*, at Manchester; to which also the *Manchester Ashton and Oldham* ought to be added, although a very short space of two other navigations must be passed through before you can reach the Irwell therefrom. Manchester is the 2d British town, with a population of 84,020 persons; Liverpool is the 4th, with 77,653 persons; and Warrington is the 45th, with 10,567 persons. This navigation commences in the Irish Sea, at Wallazey, about 3 miles below Liverpool, and terminates at the bridge between Manchester and Salford: but the powers of the act, as to improving the river and collecting the tolls, at first extended no lower than Bank-key, near Warrington, and since to Runcorn Gap. The winding course of the river has been shortened in several places by side-cuts across the loops, and locks and weirs have been erected in several places, the rise in the whole length being about 70 feet; these rivers are subject to sudden and violent floods, which have at times destroyed several of the navigation works; in August 1804 a new side-cut was completed, for shortening the course of the navigation, and avoiding the shallows in the river; between Warrington and Runcorn Gap it crosses the *Sankey* canal. The famous wet-docks at Liverpool are an appendage to the *Mersey* navigation, and are indeed a part of that river, from not being excavated in solid ground, where houses formerly stood, as they did on the site of the *London Docks*; but all of them, except the old Dock, which was a natural creek or pool, have been formed in the front of the town, by embankments in the river, which is here $\frac{3}{4}$ of a mile wide. At the lower or northern end of these docks, as we viewed them in 1797, is a large inlet or walled tide-basoon, which connects with the

river, and is dry at low water, from the S.E. corner of this is the entrance of *St. George's Dock*, which was the third large dock that was made, and is nearly a parallelogram, of 250 yards long and 100 wide, its quay being 670 yards long, its gates are 25 feet high and 38 feet wide, and it cost about 21,000 l. Passing southerly, we next arrive at a dry basin and wharf, called the old quay, for the flats or vessels belonging to the *Mersey and Irwell* company, which are about 32 in number; and some distance south of this is another large inlet to a spacious dry basin for ships: from the north end of this basin are other gates into *St. George's Dock*, above mentioned, and straight forwards is the entrance to the *Old Dock*, or the first that was built, and is wholly within the town; this dock forms an irregular parallelogram, of 200 yards long and about 80 yards wide, its gates being 23 feet high and 34 feet wide; it is lined with bricks, but all the other dock, basin, and pier walls are of beautiful hewn stone. From the south-east corner of the last described dry-basin is the entrance to *Salt-House Dock*, which was the second made, is an irregular trapezium, of 21,928 yards in area, and has 640 yards in length of quay, its gates being 23 feet high and 34 feet wide. A considerable distance south of the last dry-basin is an inlet to a small wet-dock which belonged to the late *duke of Bridgewater*, and is used by the flats which trade between Manchester and Liverpool, by *Bridgewater's* canal, these carry 50 tons, and 42 of them belonged to his grace. Proceeding further along the shore southward, we arrive at another inlet and dry-basin, from the north side of which is the entrance to the *King's Dock*, the fourth which was made (being finished in 1788), and is a regular parallelogram, of 290 yards long and 90 wide, the gates thereof being 25 feet high and 42 feet wide. From the head, or east end of the last dry-basin is the entrance to the *Queen's Dock*, which was the fifth and last that was made, being also the largest and most complete of the whole, its length is 270 yards, breadth 130, its gates 25 feet high and 42 feet wide, and it cost about 25,000 l. An attempt was made to form a dock in the site of the *old Dock*, as long ago as 1561, but it was not until the year 1710 that the first act was obtained, of which there are several, for building and regulating the present docks. In 1799 application was made again to parliament for powers to build two more large docks, one of them more northerly than any of those we have described, and the other in front of *Salt House* dock. The whole extent of these docks and quays will then be nearly 2 miles by the side of the *Mersey*! With the two dry basins last described, several convenient graving-docks connect, for the building or repair of ships, some of the latter are long enough to hold three ships in length. The space between these graving-docks and in front of the docks, is principally occupied by timber-yards. The draw-bridges over the entrances to some of these docks are among the largest and most complete in England: Mr. *Morris* erected and has the care of them and the docks. On the south side of the *King's Dock* is a spacious warehouse 210 feet long and 180 wide, for tobacco, of which it will contain 7000 hogsheads. The spring-tides here rise 21 feet, but the neap-tides only 12 feet, on which account large ships cannot enter or leave these docks for some days during the lowest tides. Fires and smoking of tobacco are on no account allowed on board of ships in these docks, nor lighted candles, except in proper lanterns, and no gunpowder is allowed on board; by a strict attention to which rules, no fire has ever happened in these docks. In the year 1797 the tolls in these docks amounted to upwards of 13,300 l. annually, and their yearly expences to 5,100 l. but a debt of 113,419 l. still remained on them: for many of the above particulars we are indebted to *W. Moss's Liverpool Guide*. In the year 1737

Worsley

Worsley Brook was intended (and an act passed 10 Geo. II.) to be made navigable; and, in 1758, a branch of *Bridge-water's* canal was intended to join at Hollin Ferry, but neither of these has been executed. In 1771 Mr. *James Brindley* proposed an aqueduct-bridge over the estuary of the *Mersey* river, for the use of the intended *Liverpool and Run-corn* canal; and in 1801 Mr. *Ralph Dodd* tried to persuade the adoption of a road-bridge over the same at Castle Rock near this place, 412 yards long, which he stated might be built for 47,000*l.* In 1799 it was suggested that a tunnel might be made under the *Mersey* at Liverpool to the opposite shore in Cheshire, $\frac{3}{4}$ of a mile; in the same year it was in contemplation to build an aqueduct over the *Irwell*, for the use of the *Manchester Bolton and Bury* canal, to enable it to join *Bridge-water's* canal; and in 1804 it was proposed to bring the *Weaver* navigation to Welton Point on this navigation, by a new side-cut, near that river from Frodsham, to avoid the shallows near the junction of the rivers. In 1758 the price of carriage on this navigation, between Liverpool and Manchester was 12*s.* per ton, but on the completion of *Bridge-water's* canal it fell to 6*s.* per ton.

MILFORD HAVEN. This famous estuary and harbour for large ships, has nearly an east course, for about 17 miles, in the county of Pembroke, in South Wales, commencing in St. George's channel, and terminating near Landshipping ferry, where it is joined by the *Douglidge* and *Clelby* rivers: it has also creeks or branches extending to Pembroke, to near Carew Castle, to Crefwell, to Nangle, &c.

MONKLAND CANAL. The general direction of this canal is nearly east, for about 11 $\frac{1}{2}$ miles in the county of Lanerk in Scotland, its eastern end is considerably elevated; its objects are the supply of Glasgow, Paisley, &c. with coals from Monkland collieries, and the export of farming products. It commences in the basin of the branch of the *Forth and Clyde* canal, and thereby communicates with the *Clyde* river, and the *Edinburgh and Glasgow* canal. Glasgow is the 5th British town, with a population of 77,385 persons. In 1803 the *Glasgow and Saltcoats* canal was proposed to connect with this at Glasgow.

MONMOUTHSHIRE CANAL. Acts 32, 37, and 42 of Geo. III.—The general direction of this compound of canals and rail-ways is nearly north, for 17 $\frac{3}{4}$ miles, in the counties of Monmouth, and Brecknock in South Wales; its northern ends are very greatly elevated; its object is the export of coals, lime, and iron from the country through which it passes; near Pontypool it is joined by the *Brecknock and Abergavenny* canal, at Pill-Gwenly it joins to the *Sirhowy* tram-road (by means of the *Ufke* river), and at Count-y-Billa farm, and at Risca, it joins the same again by different branches belonging to this company. Newport and Pontypool are considerable towns on this line. This canal commences in the tide-way of the *Ufke* river, near to the *Severn*, at Pill-Gwenly, and terminates by a rail-way extension at Blaen-Afon iron furnaces, having also a principal branch of canal from the line at Crynda-Farm, near Malpas, and continued by a rail-way to Beaufort iron-works, 21 miles: from this branch are rail-way branches to Sorwy furnace, 1 $\frac{1}{2}$ mile, to Nant-y-glo works, 6 $\frac{1}{2}$ miles, and another to the *Sirhowy* tram-road at Risca: from the line near Pontypool is a rail-way branch, 1 mile, to Tronsnant furnace, and another, of $\frac{1}{2}$ a mile, to Blaen-Dir furnace. From the *Ufke* river to Pont-Newydd, 12 $\frac{1}{2}$ miles, is a rise of 447 feet by the canal, and thence to Blaen-Afon, 5 $\frac{1}{4}$ miles, is a rise of 610 feet by the rail-way: from Crynda-Farm to Crumlin bridge the canal branch rises 358 feet in 11 miles; thence for 3 miles to the rail-way bridge over Ebwy river, 3 miles, the rail-way has a rise of 139 feet, and thence to Beaufort, 7 miles, it has a rise

of 480 feet; the Nant-y-glo branch has a rise of 518 feet, along the side of Ebwy-Frach river. The locks are 60 feet long and 10 feet wide, their paddle-holes are, in some of them, united in the breast of the lock, and no sheet-piling, or inverted arch has been made below the lower gates. Much deep-cutting and embankments have here been necessary, to obtain the proper slopes for the rail-ways and inclined planes. Mr. *Thomas Dadford jun.* is the engineer: in February 1796 the canal was completed from the *Ufke* to Pontypool, and in the same year the Beaufort branch was completed. This company were authorised by their different acts to raise 275,330*l.* in 100*l.* shares: in 1802 these divided 2*l.* 12*s.* 6*d.* each annually; it is provided, that after the profits amount to 10 per cent. and 1000*l.* is accumulated as a fund, the tolls are to be reduced, first on coals, so as to keep the profits within that amount. The tolls and exemptions are various, and may be consulted in *Phillips's 4to. History, Appendix*, p. 18 and 19, where tolls are specified for cattle passing on the rail-ways. Nine miles of the *Sirhowy* tram-road was made by this company, who receive the tolls thereof, as also 110*l.* per annum from that company, on account of the junctions therewith: to the *Brecknock and Abergavenny* company this company paid the sum of 3000*l.* for the benefit of their junction herewith, and their taking the same tolls only on goods passing on it from this canal as are charged hereon. Rail-way branches may be made to any works within 8 miles of this canal or its branches. In the year 1805 it was proposed to continue this canal lower down the *Ufke* river, to avoid its imperfect navigation.

MONTGOMERYSHIRE CANAL. Act 34 Geo. III.—The general direction of this canal is nearly S.W. for 27 miles in the county of Salop and of Montgomery in North Wales; it is considerably elevated, particularly its southern end; its objects are the supply of the country with lime, the export of its farming products and of coals, slate, free-stone, iron, lead, &c. from different parts near the line: it connects with the *Severn* river at Welshpool. Welshpool, Montgomery, and Newton are considerable towns on or near this canal: it commences in the Llanymynach branch of *Ellesmere* canal, at Portyvain lime-works in Llanymynach, and uniting with the same again near Verniew river in Llanymynach, it terminates at Newtown: it has a cut of 3 $\frac{1}{2}$ miles to the *Severn* river at Welshpool and to Guilsfield. From the *Ellesmere* branch to Newtown is a lockage of 225 feet: the Guilsfield cut is level. Mr. *Thomas Dadford jun.* is the engineer. In August 1797, 16 miles of the canal were finished and opened from the *Ellesmere* branch to Garthmill near Berriew. The company were authorised to raise 92,000*l.*; the amount of each share 100*l.* The water of Lledan Brook is to be taken to supply this canal for 24 hours weekly, from Saturday to Sunday evening; the company are bound to purchase certain mills, if their trade is injured by the canal: and certain creditors on turnpike tolls near the canal are also indemnified: the profits are not to exceed 10 per cent. but the tonnage is to be reduced, but not so as to bring the profits below 8 per cent.: the rates of tonnage and exemptions are various: see *Phillips's 4to. History, Appendix*, p. 151 and 152. About the year 1794 the *Welshpool and Leominster* canal was proposed to join this near Welshpool.

NEATH CANAL. Acts 31 and 38 Geo. III.—The general direction of this canal is nearly N.W. for about 14 miles in the county of Glamorgan in South Wales; and its northern end is considerably elevated; its object is the export of coals, iron, lime-stone, &c. from the mines and works near the line; which commences in the tide-way of the *Neath* river, at Giants-grave pill in Briton's-Ferry, and terminates in the *Aberdare* rail-way branch at Abernant near Furno

Vaughan: being joined near Briton's Ferry, in the *Neath* river, by the *New Chapel* canal. Neath is the only considerable town on this line; near Merlin's Court is an aqueduct over the Neath river. This company were authorised to raise 35,000*l.*; they are authorised to make rail-way branches to any place within 4 miles of the line, by consent of the land-owners. In 1798 this canal was nearly finished, except about two miles at the lower end. Here is a singular provision, that the rates of warehouse-room are to be the same as are charged by the *Staffordshire and Worcester* company at the Stourport warehouses.

NEATH RIVER. The general direction of this navigation is nearly N. for about 4 miles in the county of Glamorgan, in South Wales: the tide flows through its whole length from Swansea bay to Neath bridge; at Giants-grave pill near Briton's Ferry it is joined by the *Neath* canal, and near Briton's Ferry by the *New Chapel* canal; its chief objects are the supply and trade of Neath, and the export of the coals and iron brought down by the canals.

NEN RIVER (lower district.) Acts Geo. II., and 34 of Geo. III.—The general direction of this navigation is about S.W. by a very crooked course of nearly 75 miles in the counties of Cambridge and Huntingdon, and skirting those of Lincoln and Northampton; this is by what appears to have been its ancient course through the Fens, beginning in the tide-way at Peter's point about 9 miles below Wisbeach, passing that town, where is a bridge built of stone with one flat semi-elliptic arch of 70 feet span; and turning south-eastward by an ancient course (which is now rendered useless to navigators by the *Wisbeach* canal, which joins this river at Wisbeach and again at Outwell), to Outwell and Apwell, thence to March and Benwick, thence through Ramsey, Ugg, and Whittlesea Meers, through Horsey-bridge, and Standground sluice to Peterborough, and thence by the regular channel of this river to the commencement of the upper *Nen* navigation at Thrapston; in after times, a navigable course has been opened, for part of the waters of this river through Well-Creek, about 5 miles in length, from near Outwell-church to the Great *Ouse* river at Salter's-Load; another from Standground (1½ mile below Peterborough) through Catt-Water and Shire Drain of about 24 miles in length to the *Nen* river again at Gunthorpe-sluice (about 6½ miles below Wisbeach), this last having a cut of about 2 miles in length from it into the old *Welland* river near Crowland; in 1490, bishop Moreton cut a new straight course 40 feet wide and 13 miles long, called Moreton's Leam, for a part of these waters, from Standground sluice (about 2 miles below Peterborough) to near Guyhirne, and thence 3 miles by an old channel to the *Nen* again near Wisbeach; also, at Benwick this river is joined by the Benwick-Meere branch, of the Great *Ouse* river. The above will serve to give some idea of the principal lines of navigation belonging to this river through this surprizing country; but as all the rivers, and all drains almost in the fens are embanked on both sides, and owing to the deficiency of fall are almost still water, there are a great number of smaller navigable branches intersecting and crossing each other in all directions, so that it would be in vain for us to attempt to describe them. The powers of the commissioners under the above acts, extend only about 30 miles downwards to Peterborough bridge; the navigations through the fens are preferred by the fen corporation in maintaining their drainage works. In 1721, Mr. Nathaniel Kinderley recommended the cutting of a new channel or out-fall for this river (as has been since successively practised by him on the *Dee* river at Chester) from the mouth of Shire-drain at Gunthorpe-sluice straight along the N.W. shore for 2 miles to Peter's point; and the work was begun, but the

mistaken notions of the people of Wisbeach then, and till lately, prevented its completion: we are glad, however, to hear, that the same is likely now to be soon accomplished, and a greater depth of water obtained in this river, and through Crofs-keys wash to Lynn and Boston deeps. By the act for *Wisbeach* canal 34 Geo. III., all vessels passing out of or into that canal from the *Nen* are to pay 3*d.* per ton, out of which 100*l.* is to be paid annually to the commissioners under the above acts for improving this river above Peterborough, and the remainder is to be applied to deepening and improving the same between the *Wisbeach* canal at Outwell and the *Ouse* river at Salters-Load. Boats which have paid the above toll are to pass toll free at Salters Load, and Standground sluices on this river.

NEN RIVER, (upper district.) The general direction of this navigation is nearly S.W. for about 23 miles, in Northamptonshire: it is not greatly elevated; its objects are the supply of Northampton and the surrounding country with coals, deals, &c. and the export of agricultural productions. The communication between Lynn, London, Liverpool, Manchester, &c. which it now effects is also important. Northampton is the 85th British town with a population of 7,020 persons, Wellingborough, Thrapston, and Higham-Ferrers, are also considerable towns on or near this river; it commences in the lower *Nen* navigation at Thrapston, and terminates at the rail-way branch of the *Grand Junction* canal at the town of Northampton, where also it is to be joined by the *Leicestershire and Northamptonshire Union* canal. This navigation has been improved by a great number of side-cuts and pound-locks by the side of the river in different places; it was completed and opened to Northampton on the 7th of August 1761. About the year 1793, the *Leicester and London* canal was proposed to cross this river near Wellingborough.

Newark and Bottesford. In the year 1793, a canal was intended from the *Dean* river at Newark to the long level of the *Grantham* canal at Stainwith, passing near the town of Bottesford. In the *Grantham*, act 33 Geo. III., the tolls are provided that are to be paid at the junction of these canals, if this is ever executed.

Newcastle and Carlisle. In the year 1795, Mr William Chapman surveyed the line for a canal from the *Tyne* river at Newcastle to the *Eden* river at Carlisle, through Durham, Northumberland, and Cumberland, crossing the grand-ridge for a connection between the east and west seas; and having a collateral branch of narrow canal and inclined-planes to the elevated mining districts of Weardale and Teesdale forests, &c. the estimate being 355,067*l.* On the rejection or suspension of this scheme, a canal from *Newcastle to Haydon-bridge* was proposed as below.

Newcastle and Haydon-Bridge. In 1796, and again, in March 1802, it was in contemplation to make a canal nearly following the course of the *Tyne* river, between Newcastle and Haydon, in Northumberland and Durham.

Newcastle and Maryport. Some years previous to 1801, a canal was projected between the tide-way in Maryport harbour and the *Tyne* river at Newcastle, crossing the grand ridge, and passing between the two seas, though Cumberland and Durham counties: a bill for the same was brought into parliament, but rejected, owing to the opposition that the favourers of another scheme gave to it: in 1801, the scheme was again revived, but nothing effectual has been done towards its adoption.

NEWCASTLE (under-line) CANAL. Act 35 Geo. III.—The general direction of this navigation is nearly west, by a very bending course of 3 miles, in the county of Stafford: its objects are the bringing of Caldor lime for manure, and

and the export of coals and farming products: it is considerably elevated. Newcastle is a considerable town, and its neighbourhood very populous. This canal commences in the *Trent and Mersey* canal (near to the end of the Caldon branch) at Quinton's Wood, in Stoke, and terminates in the *Newcastle under-line Junction*, at the south-east corner of Newcastle town. It was completed in a short time after the act was obtained, the company being authorised to raise 10,000*l.*; the amount of shares therein is only 50*l.* each. The rates of tonnage and wharfage are on coals, lime-stone, and iron-stone 1½*d.* per ton per mile, on all other goods 2*d.* per ton per mile, but for less than a ton of any article in a boat 6*d.* Between December and the 1st of April this company may take flood waters from the Trent river.

NEWCASTLE (under-line) JUNCTION CANAL. Act 38 Geo. III.—The general direction of this canal is about N.W. for a short distance, in two detached parts, in the county of Stafford: its western ends are much elevated, and terminate near the grand ridge on its eastern side: its object is the export of coals and agricultural produce. Newcastle is a considerable town on its line. It commences in the *Newcastle under-line* canal, at the S. E. corner of that town, and terminates its eastern part in the canal of Sir *Nigel Bowyer Grefley*, near the S.W. corner of the town; its western part commences in *Grefley's* canal above mentioned, near Apedale, and extends to Partridge-Nest collieries, with a branch to Bignel-End collieries. This company were authorised to raise 12,000*l.*, the amount of their shares being 50*l.* only: provision is made in the act for inclined planes and water-levels, or rail-ways, with engines to raise water or draw trams, &c. in case any of these should be found more eligible than a canal with locks, in any part. Pleasure boats to pay for 6 tons if they pass any lock. In 1796, the *Commercial* canal, for 40 ton boats, between the *Asby* and *Chester* canals, was proposed to occupy or pass through the line of this canal, when enlarged.

NEW CHAPEL CANAL. The general direction of this canal is east, by a bending course of about 3½ miles, in the county of Glamorgan, in South Wales; the greater part of it is cut through a morass, but little above the level of the tide-way in which it commences, in the river *Neath*, near Briton's Ferry (near the entrance of the *Neath* canal), and terminates at New Chapel, near Swansey: it is the sole property of the owner of the land, and for whose improvement, by draining and otherwise, it was principally undertaken.

Newport and Stone. In June 1797, it was proposed to make a canal from the *Donnington Wood* canal (the marquis of *Stafford's*) at Pave-lane, near Newport, by Eccleshall, to the *Trent and Mersey* canal, near Stone, a course of about 18 miles, in the counties of Salop and Stafford, crossing the grand-ridge; a branch was proposed to Market-Drayton: its object was the opening of a direct communication between Shrewsbury, and other places on or near the upper parts of the *Severn*, and the *Trent and Mersey* canal, for supplying the intermediate country with coals and lime, &c. In 1765, the *Tern-bridge and Winsford* canal was proposed, and intended to pass through nearly the same ground as the middle parts of this canal; as was also the *Sandbach* on an other occasion.

NEWRY CANAL (Ireland). This canal, from the tide-way at Fadham point to the town of Newry, was completed under the direction of Mr. *Golborne*, in February 1761, after being two years in hand, by which brigs of 80 or 100 tons burthen can come up to Newry; it was intended to extend this to the *Blackwater* navigation, for conveying the *Dungannon* and *Drumglafs* coals to Dublin; and the Irish parliament, between 1753 and 1771, granted different sums of

the public money for this purpose, amounting to 11,434*l.* but the work then was far from being completed.

NITH RIVER. The course of this river (sometimes called the Nid) is nearly north for about 9 miles, between Dumfries and Kirkcudbright counties, in Scotland; the tide flows through its whole length, and its object is the supply of Dumfries, (the 79th British town, with 7,288 persons); it commences in Solway Firth, and terminates at Dumfries bridge, which is of stone, with 13 arches. In 1760, Mr. *John Smeaton* was consulted on the encroachments by jetties of stakes and stones for gaining land, that had been made at Cargin, Lagal, and Netherwood, on this river, and recommended the removal of some of these works at the projecting points of the river.

NOTTINGHAM CANAL. Act Geo. III.—The general direction of this canal is nearly N.W. by a crooked course of about 15 miles, in the county of Nottingham; it is not very greatly elevated: its objects are the export of coals from the several mines near it, and of farming products, importing lime, deals, &c. Nottingham is the 17th British town, with a population of 28,861 persons. This canal commences in the river *Trent*, near Nottingham (opposite to the junction of the *Grantham* canal), and terminates in the *Comford* canal, near Langley bridge, and near to the termination of the *Erewash* canal: near to its southern termination it is joined by the *Trent* canal or side-cut (from the *Trent and Mersey* canal). A reservoir is made near Amfworth for the supply of this canal, and has a self-regulating sluice which lets out near 3000 cubic feet of water per hour for certain mills and the *Erewash* canal. In 1802, this canal was completed.

NUTBROOK CANAL. Act 33 Geo. III.—The general direction of this canal is nearly N.W. for 5 miles, in the county of Derby: it is not greatly elevated: its object is the export of coals from the mines near the line; which commences in the *Erewash* canal, near Stanton, and terminates at Shipley colliery; it has a branch to West Hallam collieries. Sir Henry Hunloke and Edward Miller Mundy, esq. were authorised to raise 19,500*l.* between themselves, in 100*l.* shares; their profits hereon are not to exceed 8 per cent.; and proprietors of adjoining lands may make side branches thereto: the particulars of the tonnage rates are very long, including some regulations with the *Erewash* company, &c. See *Phillips's* 4to. *History, Appendix*, p. 104 and 105.

OAKHAM CANAL. Acts 33 and 40 Geo. III.—The general direction of this canal is about S. E., by a crooked course of 15 miles, in the counties of Leicester and Rutland: its southern end is considerably elevated, crossing the Tilton and Burley branch from the grand-ridge: its objects are the supply of Oakham, and the country through which it passes, with coals, deals, &c., and the export of agricultural products. Oakham and Melton-Mowbray are considerable towns on this line, which commences in the *Leicester and Melton-Mowbray* navigation, at Melton-Mowbray, and terminates at the town of Oakham. From the *Leicester and Melton-Mowbray* navigation to Edmondthorpe, 8½ miles, it has a rise of 126 feet; the remaining 6½ miles to Oakham are level, and it is fed by a reservoir for flood-waters in Langham, and another in Saxby. The engineers were Mr. *William Jessop* and Mr. *C. Staveley*, jun. In November 1800, this canal was opened from Melton-Mowbray to Saxby bridge, and in January 1803, the whole was completed. This company was authorised to raise 86,000*l.* in 100*l.* shares. The rates of tonnage and wharfage, with the exceptions therefrom, may be seen in *Phillips's* 4to. *History, Appendix*, p. 106 and 107; but to which the last act made an addition, and

and the *Leicester and Melton-Mowbray* act, 40 Geo. III., also contains some regulations affecting the tolls at the entrance to this canal. Earl Winchelsea is to be paid 15l. annually, in lieu of his customary dues on coals sold in Oakham town.

OUSE RIVER (*Lewes lower Navigation*). Act 31 Geo. III.—The general direction of this navigation is nearly north, for near 9 miles, in the county of Suffex: the tide flows through its whole length: its objects are the import of coals, deals, &c. and the export of farming products. Lewes is a considerable town on this navigation; which commences in the English channel, at Newhaven harbour, and terminates in the upper *Ouse* navigation, at Lewes bridge: the meadows, called Lewes and Laughton Levels, near this river, were subject to be overflowed, and it is part of the object of the above act to embank the river and its tributary streams, and to erect proper sluices, and cut drains for the improvement thereof; part of the money for which draining purposes, is to be raised by the commissioners of fewers, under the act of 23 Hen. VIII., by different rates per acre on each of the five districts into which the levels are by this act divided, but the works are to be performed by the trustees appointed by this act, who, in 1802, completed the straightening and deepening of the course of the river, so that the tides flowed higher and ebbed lower than before at Lewes bridge, and to which place vessels drawing 4 feet of water can now come up. The tolls on articles navigated on any part of this river are to be, for manures not exceeding 2d. per ton, for road-materials 3d., and for all other goods 4d. per ton, empty boats to pass toll free; these tolls are not to be lowered (except road-materials to 2d.), so long as 6,000l. of the money borrowed on the credit of these tolls and the acre-taxes, remain undischarged; the tolls are intended hereafter to be so reduced, that one-third of the whole expenses of maintaining the navigation and drainage works shall be paid by the acre-taxes, and two-thirds by the tolls on the river; the acre-tax is, however, to make up the deficiency, if the above tolls are inadequate; lands below Newhaven bridge are not to be taxed, but to maintain their own banks. In the year 1762, Mr. *John Smeaton* was consulted about improving the navigation and drainage of this river. About the year 1793, a new pier was built to protect the harbour of Newhaven, and the entrance of this river; in 1802, it was proposed to add a new groin thereto to the westward, for the further security of vessels; and, in 1804, it was in contemplation, by large stones from the neighbouring cliff, to extend a rough unwall'd pier much further out into the sea, for the security of vessels on this coast.

OUSE RIVER. (*Lewes upper Navigation*). Act 30 Geo. III.—The general direction of this navigation is nearly north-west, by a bending course of about 22 miles, in the county of Suffex: it is not much elevated above the level of the sea: its objects are the import of coals, deals, &c. and carrying chalk and manures to the lands, and the export of their agricultural products. Lewes and Cuckfield are considerable towns on this line; it commences in the lower *Ouse* navigation, at Lewes bridge, and extends to Hammer bridge, near Slaugham, with a branch to Offham chalk-pit, in Hants; the depth of water in every part is to be made $3\frac{1}{2}$ feet: the boats to be 50 feet long and $12\frac{1}{4}$ feet wide, and are not to pass locks with less than 10 tons of lading. This company were authorised to raise 25,000l. in 100l. shares, and the works were not to commence until 10,000l. of this was subscribed, and 10 per cent. thereon actually paid: it is to that public spirited and worthy nobleman lord *Sheffield* that the country are in a

principal degree indebted for bringing about this useful measure. From Lewes bridge to Barcome mill there was an old and imperfect navigation for small boats; on this part of the line, the rates of tonnage are to be, on manures, road-materials, timber, grain, &c. $\frac{1}{2}$ d. per ton per mile, and on all other goods 1d. per ton per mile; on the remainder or new part of the line, manures, &c. as above, are to pay 1d. and other goods $1\frac{1}{2}$ d. per ton per mile. Empty boats to pay 1s. for passing each lock, and pleasure boats 3d. below and 6d. above Freshfield bridge for passing locks. Between Old Eye, in South Malling, and Land-Port, no toll is to be taken, on goods carried no farther. Branches may be made to any place within 2000 yards of this river, on which the powers of the commissioners of fewers (23 Hen. VIII.) still continue. In 1801, it was proposed to make an extension of the *Surry iron rail-way* to join this navigation at Linfield. In 1802, the navigation was not completed up to Hammer bridge; but, in the following year, it was said that a new act for further powers for that purpose was in contemplation.

OUSE (great) RIVER. The general direction of this river is nearly S. W., by a crooked course of about 84 miles, in the counties of Norfolk, Cambridge, Huntington, and Bedford, and skirting Suffex for a short distance: this course through the fens being from the tide-way in Lynn-deeps, (2 miles below that town), past Lynn, Telney, Salter's-Load, Denver-sluiice, Rebeck, Little-port-chair, Ely, Harriemere, Hermitage-sluiice, Erith, and thence by the regular channel of this river to Bedford. Soon after the year 1630 (in consequence of a law of fewers of the 13th of January, 6 Charles I.) the old Bedford river, (a straight cut, of 21 miles long and 70 feet wide), was made, between Hermitage-sluiices and Salter's-Load, for conveying part of the waters of this river; and in 1652, the scheme of Sir *Cornelius Vermuyden* for another navigable cut nearly parallel to the last was carried into effect, (under the authority of an act of Cromwell, 1649, confirmed afterwards by 15 Charles II. establishing the fen corporation); this last, called the New Bedford river, is 20 miles long and 100 feet wide, from Hermitage sluiices to Denver's sluiice, both these new cuts falling into the great *Ouse* river again, at Salter's-Load and Denver's sluiice (which are within about a mile of each other, and 17 miles from Lynn); besides these, part of the waters of this river make their way by a navigable cut of about 12 miles in length, from Hermitage into the *Nen* river at Benwick. In 1725, Mr. *Thomas Badeflade* mentioned, and, in 1751, Mr. *Nathaniel Kinderley* strongly recommended, another shorter cut between Eaubrink and Lynn, for straightening the course of this river, for which the acts of the 35, 36, and 45 of Geo. III. have been passed, called the Eaubrink cut, and on which Mr. *Robert Mylne*, Sir *Thomas Hyde Pate*, and captain *Joseph Huddart* are employed as engineers; this cut was, in September 1804, marked out, and is intended to be 296 feet wide at the east end, 204 feet at the west end, and about $2\frac{1}{4}$ miles in length, making easy bends into the river at each end, with banks on each side, at a distance from the cut, 6 feet higher than the ordinary tides, of 15 feet rise, with an embankment and sluice across the old channel, above the east entrance of the new one; which important works ere long, we hope, will be completed. Near the harbour of Lynn this river is joined by the *Lynn* river; at Salter's-Load, by a branch of the *Nen* navigation (called Well Creek); between Salter's-Load and Denver's sluiice it is joined by *Stoke* river; at Rebeck the little *Ouse* joins; at Priek-willow the *Lark* river joins; near Barkway chapel the *Soham-Lode*; at Harriemere, the *Cam* river joins; and at Temsford the *Ivel* river also joins: the whole of the rivers and large drains in the

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these fens being embanked and nearly level; there are many others of them navigable for short distances besides the above. Lynn is the 50th British town, with a population of 10,096 persons: Downham, Ely, St. Ives, Huntingdon, St. Neots, are also considerable towns on this line. Denvers dam and sluice, with 5 eyes or arches, was built across the great *Ouse* river, just above the entrance of the new Bedford-river, in the year 1651; in 1713, the water having undermined three of the arches, they were carried away, and were not rebuilt again until 1746. At Willington and others of the mills in the upper parts of this navigation, there is a kind of self-acting sluices in use, which fall down to let the water pass freely over them, when the water in a flood rises above a certain height; the locks on this part of the navigation are of wood, the towing-path has stiles near it, and is frequently interrupted as before mentioned. In November 1796 a dry dock in Lynn, connecting with this river, was opened, being the first work of the kind which had been erected for the accommodation of that port. About the year 1780, a cut, of about $1\frac{1}{2}$ mile in length, was made from this river, in Willington, to the turnpike road in Cople, where a house and conveniences for a wharf were built (now the Dog ale-house) at a great expence; but the consent of the proprietor of the *Ouse* navigation, who holds it under a particular grant from the crown, could not afterwards be obtained for this cut being used as a navigation. In 1785, and again in 1802, the *London Lynn and Norwich* canal was proposed to join this river at Lynn. And in 1792, the *Leicester and London* was proposed to join and cross it at Bedford.

OUSE (Little) RIVER. This river (often called the Brandon) has its course nearly east, for about 20 miles, between the counties of Norfolk and Suffolk: it is not greatly elevated in any part: its objects are the import of coals, deals, and the export of agricultural products. Brandon and Thetford are considerable towns on this river, which commences in the great *Ouse*, at Rebeck, and terminates at the town of Thetford, to which place boats with 14 or 15 chaldrons of coals in each could come up in the year 1649. The lower part of this river for several miles is embanked on both sides, through the fens. In the year 1789, this navigation was proposed to be joined at Hils near Wilton by the intended *Bishopstortford and Wilton* canal.

OUSE RIVER (York). Act 23 Henry VIII.—The general direction of this river is nearly north-west for about 48 miles, between the East, West, and North Ridings and Ainsty Liberty in Yorkshire; it is not very greatly elevated in any part; its objects are the trade and supply of the city of York, and of the immensely populous and trading districts in the West Riding. At Goole-*Bridge* it is joined by the *Don* river; at Armyn, by the *Ayre and Calder* navigation; at Barnby, by the *Derwent* river; at Selby, by a cut of the *Ayre and Calder* navigation; near Cawood, by the *Wharfe* river; and at York, by the *Foss* river. York is the 23d British town, with a population of 16,145 persons. Howden, Snaith, Selby, and Cawood are also considerable places on or near this river; which commences in the *Humber* river at Trent-fall (the junction of the *Trent* river) to the *Tore* river at Linton. Ships of 150 or 160 tons burthen come up to Armyn, and smaller masted vessels to York city. By a licence of Richard II. the corporation of York are required to maintain certain bridges on the upper part of this river. In the year 1795, a large wooden draw-bridge, of 13 openings, was built by Mr. *William Jessop* over this river at Selby, under an act of parliament. In 1769, the *Selby and Leeds* canal was proposed to connect with this river at Selby.

OXFORD CANAL. Acts 9, 15, 26, 34, and 39 of Geo. III.—The general direction of this canal is nearly north, by a very crooked course in its northern half, of 91 miles, in the counties of Oxford, Warwick, and Northampton; it crosses the grand-ridge by a tunnel, and its northern part skirts along near to it on the western side for many miles; its objects were a communication between the midland canals and the metropolis, (but a much nearer route is now opened by the *Grand-Junction* canal,) the supply of the northern parts of Oxfordshire with coals, the export of farming products, &c. At Woolvercot is a cut of about $\frac{1}{4}$ mile (belonging to the duke of Marlborough), by which a communication with the *Thames and Isis* navigation at Godstow is effected. At Napton the *Warwick and Napton* canal joins this; and at Braunston the *Grand-Junction* canal joins. Coventry is the 24th British town, with a population of 16,034 persons; and Oxford is the 38th, with 11,694 persons. Woodstock, Deddington, Banbury, Southam, Daventry, and Rugby are also considerable towns on or near to this line of canal; which commences in the *Thames and Isis* navigation at Badcock's Garden on the west side of Oxford city, and terminates in the *Coventry* canal at Longford. At Hillmorton and at Napton are short cuts, of about $\frac{1}{2}$ a mile each, to the steam-engines belonging to this company. From the *Thames and Isis* at Oxford to Banbury, $27\frac{1}{2}$ miles, is a rise of 118 feet by 18 locks (including 2 weir-locks and an entrance lock from the *Isis*); thence to Claydon, $7\frac{1}{2}$ miles, is a rise of $77\frac{1}{2}$ feet by 12 locks; thence (through the Fenny-Compton tunnel) the summit pound continues to Marlton-doles wharf $10\frac{3}{4}$ miles, and level; thence to Napton on the hill 2 miles, is a fall of $55\frac{1}{2}$ feet by 9 locks; thence to Hillmorton, $16\frac{3}{4}$ miles (in which the *Warwick and Napton* and the *Grand-Junction* join), is level; thence in $\frac{1}{2}$ a mile is a fall of 19 feet by 3 locks; thence to the *Coventry* canal at Longford, $26\frac{1}{2}$ miles, is level. The two short cuts to the engines, and that at Woolvercot, are level. This canal is 28 feet wide at top, 16 feet at bottom, and $4\frac{1}{2}$ feet deep, except the summit pound, which is made 6 feet deep in order to act as a reservoir; the locks are $74\frac{3}{4}$ feet long, and 7 feet wide. At the toll-house near Longford is a stop-lock, to prevent the *Coventry* canal in dry seasons, from lowering the water in the long pound on this; from which long pound an engine at Hillmorton pumps water into the Braunston pound, by means of a feeder; and out of this last pound by means of a sough. Another engine at Napton pumps into the summit pound, which is also fed by three reservoirs. The number of stone and brick bridges on this line is 188, and of wooden, swing, draw, and foot bridges 66. The Fenny-Compton tunnel is 1188 yards long, $9\frac{1}{2}$ feet wide, and $15\frac{1}{2}$ feet high. At Newbold is a tunnel 125 yards long, made under the church-yard and street, 16 feet high, and $12\frac{1}{2}$ feet wide, with a towing-path through it. At Wolfhamcote, also, there is a short tunnel. At Pedlars-Bridge near Brinklow is an aqueduct bridge of 12 arches, of 22 feet span each. At Cosford on the Swift river, and at Clifton on the Avon, are others of 2 arches each; at Wolfhamcote, Adderbury, and Hampton-Gay, are other smaller aqueducts. Mr. *James Brindley* made the survey for this canal in September 1768; in August 1769 he began the work near Longford; and in 1775 it was completed from thence to the Napton locks; when 122,300l. having been expended, the works stood still for want of money until 5th April 1786, when they were resumed; on the 31st of March 1778 the line was opened northward to Banbury; and on the 1st of January 1790 the whole was completed. Mr. *James Barnes* was employed to execute some of the digging of this part. This company have been

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authorised to raise, by their different acts, 330,000l.; the amount of their shares is 100l. each. In January 1800 these are said to have sold for 194l., and in 1802 for 275l. each; the *Grand-Junction* company being bound to make up the tolls hereon to 10,000l. annually, (if the works are kept in order) on condition of this company taking only certain tolls on goods passing to or from that canal, (see *Phillips's 4to. Hist. Append. p. 32.*) and agreeing to widen about 35 miles of their canal and locks, that large boats may pass north of Braunton, whenever the *Grand-Junction* company shall require the same of this and the *Coventry* company. The rates of tonnage are rather complicated; they will be found in *Cary's Inland Navigation*, pages 59, 74, and 80. For parcels under 5 cwt. the company are to fix specific rates in their printed tonnage tables. Coals from the inland pits were not allowed, by the first act above, to come nearer to London than Oxford; but by the 3d act, this was extended to Reading and the *Kennet* navigation; and in the year 1800 this company offered 2s. per ton as a premium on coals carried certain distances from their canal into Berkshire, &c. The narrow barges used on this canal seldom venture down the *Thames* to London, but goods are generally shifted at Oxford into the *Thames*-barges. About the year 1792 the *Stratford and Croperdy* canal was proposed to join this at Croperdy; and, at the same time, a canal from *Hampton-Gay* to *Isleworth* was intended, to join this at Hampton-Gay.

PARNEL'S CANAL. This short canal, or rather water-level, has nearly a north direction for about $\frac{1}{2}$ a mile in the valley north of St. Austle, (near the south coast of Cornwall) one mile above that town; it commences within an immense excavation of great depth, and open to day, which has, by the work of ages, been made in a rocky hill abounding with tin ore. It is tunnelled through the solid rock for 200 yards or more, on a level to the surface of the hill, and proceeds forwards thereon to the top of an inclined plane, of about 50 feet fall, where the boats are raised up an end by a windlass to shoot out the ore, as already described on *St. Columb* canal. At the bottom of the plane the ore is loaded into carts, to be carted to the stamping-mills. Small square-headed boats are used, and four or five of them are linked together to be shoved through the tunnel, by means of chains which are fixed along its sides for that purpose, and they are afterwards towed along the canal to the head of the plane. This canal, tunnel, and plane, were made at the expence of Mr. Parnel, who owns the mine, about the year 1770, before which the ore was drawn up to the top edge of the pit or mine, and carted from thence.

PARRET RIVER. The course of this river is nearly south-east for about 5 miles, in the county of Somerset; it is not greatly elevated; its objects are the import of coals, and the export of agricultural products. Langport is the only considerable town near this navigation. It commences in the *Tone* and *Parret* navigation at Borough-Chapel, and terminates in the *Ivelchester* and *Langport* navigation, a little below Langport.

PEAK-Forest CANAL. Acts 34, 40, and 45 of Geo. III.—The general direction of this canal and rail-way is nearly south-east for 21 miles, in the counties of Chester and Derby; its southern end is very considerably elevated, and terminates on, or very near to, the Grand-Ridge; its principal object is the export of the Peak-Forest lime, and of coals from the neighbourhood of this canal. Ashton-under-line, Stockport, and Chapel-le-Frith are considerable towns on or near this line; which commences in the *Manchester Ashton and Oldham* canal, at Duckenfield, (near to the termination of the *Huddersfield* canal,) and the canal terminates

at the basin and lime-kilns in Chapel-Milton, whence a rail-way proceeds to Loads-knowl lime-stone quarries in the Peak. The line of the canal is 15 miles in length, and of the rail-way 6 miles; there is a cut of $\frac{1}{2}$ a mile to Whaley-Bridge, and a rail-way branch of $1\frac{1}{2}$ mile to Marple. Over the Mersey river, near Marple, is a grand aqueduct bridge of 3 arches, each 60 feet span and 78 feet high, the whole height of the structure being near 100 feet, which was built in the year 1799. (This bridge we have before, by mistake, when treating of Aqueducts, mentioned as being on the *Manchester Ashton and Oldham* canal.) Mr. Benjamin Outram was the engineer, and the works were completed on the 1st of May 1800. The company were authorised to raise, by the first act, 150,000l., each share being 100l., which in 1802 bore a premium of 10 per cent. It has been said, on several occasions, that this canal and rail-way were completed at 10 per cent. under the original estimate, and that the 2d act authorised the company to raise any unlimited sum that they might want, in which there certainly were mistakes, because the act of the last session was for raising a further sum of money. For the rates of tonnage and wharfage, see *Phillips's 4to. History, App. p. 155.* Mine-waters may be used for the supply of this canal, but only the flood-waters of the rivers.

PENTLAND FIRTH. This freight has nearly a west direction between Caithness county, at the north-eastern extremity of Scotland, and the Orkney islands. This, though a rocky and dangerous passage, is much frequented by ships, on account of being the first passage which presents itself for ships in going northward, between the East and West Seas, or German Ocean and Irish Sea. The *Inverness* and *Fort-William* canal, now cutting a great way south of this for the use of ships, is expected much to lessen the use of this firth. Serabster roadstead, on the side of this firth, is a harbour much frequented by ships in blowing weather. Thurso harbour in Caithness, on the southern side of this firth, has a pier now building, and its harbour improving, under an act of 42 of Geo. III.

POLBROCK CANAL. Act 37 of Geo. III.—The general direction of this canal is nearly south-east for about 5 miles in Cornwall, near its north-west coast; it is not greatly elevated; its objects are the import of coals, and the export of stone and agricultural products. Bodmin is a considerable town near it. It commences at Guinea-port, near Wade-bridge, in the *Camel* river, and terminates at Dunmeer Bridge and Stoney Lane, in the parish of Bodmin, having a collateral cut of $\frac{1}{2}$ a mile to Ruther Bridge, in the same parish. At Guinea port and at Stoney-Lane Bridge large and convenient basins and warehouses are intended. Mr. John Rennie and Mr. Murray are the engineers. This company may raise 18,000l. in 50l. shares. A feeder from the *Camel* river and any springs within 2000 yards may also be taken for this canal.

POOLE HARBOUR. This spacious inlet or harbour has nearly a west course for about 9 miles, in the county of Dorset; the tide flows into every part of its various branches and inlets, and round Branksea island, which is in the middle of it; its object, besides the general trade and supply of the neighbourhood, is the export of a fine potter's clay found near to Corfe Castle, in the isle of Purbeck, and paving-stones and free-stone from thence. Poole, Wareham, and Corfe Castle are considerable towns near this harbour, which commences in Studland Bay and terminates at Wareham Bridge: a branch proceeds about $2\frac{1}{4}$ miles north to Creek-Moor. In 1797 several improvements in this harbour were in contemplation.

PORTSMOUTH HARBOUR. This inlet or harbour has nearly

nearly a north course, for about $5\frac{1}{2}$ miles, in Hampshire; the tide flows through it, and the depth of water in most parts of it is sufficient for the large ships of the British navy. Portsmouth is the 13th British town, with a population of 32,166 persons; Gosport and Fareham are also considerable towns adjoining it. It commences at Spithead, in the Channel, between Hampshire and the Isle of Wight, and terminates at Fareham Bridge, having also a branch to Cosham, and a communication therefrom to Langstone and Chichester harbours. On the shores of this harbour there are immense buildings and works, for the use and security of the royal navy. In 1805 several considerable additions were making to these works, and a bridge between Gosport and Hallar hospital, which Mr. Robert Forbes built some years ago, is intended to be taken down, having proved injurious to the harbour.

Portsmouth and Croydon Canal. In the years 1802 and 1803, a canal was in contemplation from *Portsmouth Harbour* to the *Croydon Canal* at that town, passing Havant, Chichester, Arundel, Horsham, Ryegate, and Mertham, of which that able engineer, Mr. John Rennie, prepared plans and an estimate; but the opposition of the land-owners, and favourers of a rail-way scheme from *Portsmouth to London* procured its rejection in parliament. The summit-level of this canal was to be 36 miles in length, at about 220 feet above the level of the sea: this was to be fed by several reservoirs in or near Horsham Forest, containing in the whole 500 acres, and 340,000,000 cubic feet of water. This level was to penetrate the Chalk-Hills north-east of Mertham, by a tunnel $4\frac{1}{4}$ miles long, and 350 feet below the top of those hills. The estimated expence was 721,000*l.*, and 800,000*l.* in 100*l.* shares was proposed to be raised; the expected revenue was estimated at 100,000*l.* per annum. While this line was in contemplation, there was an attempt made by Mr. Ralph Dodd to draw the public attention to a different line of canal, (which Mr. John Phillips laid claim to, as being one of the fanciful ones which he has drawn in the map to his 4to. History, 1791,) from *Portsmouth Harbour*, through *Southampton Water* and the *Itchen River*, to Winchester; thence to Alresford, near to Alton and Farnham, and to the Wey river at Godalming: from near Westley on that river, the proposed line of the *Grand Surrey canal* was to be followed to Deptford and the *Thames river*. The estimate mentioned on this occasion was 348,735*l.*

Portsmouth and London Rail-way. In 1803, Mr. William Jessop was employed to survey the line of a rail-way from Portsmouth town to the west end of Stamford-Street, near Blackfriars-Bridge, London; on the utility of which, and the *Portsmouth and Croydon canal* above, opinions were for some time divided: in the end, neither of them was adopted. The estimated expence of this work was 400,000*l.*

RAMSDEN'S CANAL. Act 14 Geo. III.—The general direction of this canal is nearly south-west for about 8 miles, in the West Riding of Yorkshire; it is not very greatly elevated; its objects at first were the supply and trade of Huddersfield town, but it will shortly have considerable importance as part of the shortest line of navigation between Hull and Manchester and Liverpool. Huddersfield is the 81st British town, with a population of 7268 persons. This canal commences in the *Calder and Hebble navigation*, at Cooper's Bridge, and terminates in the *Huddersfield canal*, at King's Mill near Huddersfield; it has a rise of $56\frac{3}{4}$ feet by 9 locks. Sir John Ramsden, who is the sole proprietor of this canal and of Huddersfield town, in 1766 employed Mr. James Brindley to plan this canal; and, after his death, it was begun and quickly completed by Mr. Luke Holt. At Huddersfield spacious warehouses are built by the side of this

canal, to which goods intended to be there lodged may be carried toll-free along the part of this canal from the *Huddersfield canal*; that company guaranteeing the tolls on this not to be lessened thereby. On the whole length or any part of this canal, coals, flags, slates, stones, lime stones, and lime, are to pay a toll of 3*d.* per ton, and all other goods 1*s.* 6*d.* per ton, except dung and manures, which are to pass free. The proprietors' profits are never to exceed 6 per cent. upon the monies laid out thereon.

Reading and Maidenhead. In 1770, a canal was proposed from the *Thames river*, at Bolter's Lock near Taplow-Hill, (at the western termination of the *Maidenhead and Isleworth proposed canal*), to the *Thames* again, at Sunning near Reading and to the *Kennet river*, on which Mr. James Brindley was consulted by the city of London, the distance being near 15 miles by the canal, and by the river above 30 miles, between the same places; a barge of 120 tons being 3 days (and often in dry times as many weeks) in performing the voyage. at an expence equal to 50*l.*; while, by this canal, it was calculated that a barge might at all times, except frost, perform it in 6 hours, at 4*l.* 7*s.* expence, including $\frac{1}{2}$ *d.* per ton to the trustees as a toll. This canal was at first proposed to commence at Monkey island in the *Thames*, which is 2 miles below Maidenhead-Bridge. No private property was to be allowed in this canal, but the money was proposed to be raised by life annuities, out of which, and the tolls, the river navigation was to be improved between Bolter's Lock and Sunning, without any new tolls being charged thereon; and when a sufficient fund was accumulated for repairs and management, the tolls were to cease, and the canal be entirely free.

RIBBLE RIVER. The direction of this river is nearly east for about 12 miles in the county of Lancaster; the tide flows through its whole length: its objects are the supply and trade of Preston town, and the export of coals brought down by the *Douglas river*, which joins it near Hasketh. Preston is the 37th British town, with a population of 11,887 persons. This river commences with a very wide estuary or mouth in the Irish Sea, but grows very shallow, so as to be fordable at low-water, and terminates at the bridge at Preston, near to the aqueduct bridge, on which the *Lancaster canal* crosses this river. In September last, (1805) it was proposed to apply for an act for placing buoys, and otherwise improving the navigation of this river.

RIPON CANAL. Act 7 Geo. III.—The general direction of this canal is nearly N.W. by a bending course of about 7 miles in the West, and skirting the North Riding of Yorkshire: its objects are the supply of Ripon, and the export of agricultural products, stone, &c. It is considerably elevated; Borough-bridge, Ripon, and Aldborough, are considerable towns on or near this canal, which commences in the *Tore river* at Milby, near Borough-bridge, and terminates at Ripon.

ROCHDALE CANAL. Acts 34, 40, and 44 of Geo. III.—The general direction of this canal is nearly N.E. by a bending course of $31\frac{1}{2}$ miles in the counties of Lancaster and York; it crosses the grand-ridge by a deep-cutting: its general objects are the communication between Liverpool and Manchester, with Halifax, Wakefield, Hull, &c. the export of coals, paving-stones, &c. At Piccadilly street in Manchester it is joined by the *Manchester Ashton and Oldham canal*. Manchester is the 2d British town, with a population of 84,020 persons; Huddersfield is the 44th, with 10,671 persons; Spotland the 55th, with 9,031 persons; and Halifax the 58th, with 8,886 persons. This canal commences in *Bridgewater's canal* at Cattle-Field in Manches-

ver, and terminates in the *Calder and Hebble* navigation at the basin, wharf and warehouses at Sowerby bridge: to near Hollingwood chapel there is a branch of $\frac{3}{4}$ of a mile, and another of $\frac{1}{2}$ a mile to School-lane in Castleton near Rochdale. From *Bridgewater's* canal to Piccadilly wharf, and the *Manchester Ashton and Oldham* canal, $1\frac{1}{2}$ mile, has a rise of $75\frac{1}{2}$ feet; thence to the Hollingwood branch, $4\frac{3}{4}$ miles, has a rise of 81 feet; thence to Failsworth brook, $2\frac{3}{4}$ miles, is level; thence to the Rochdale branch, $4\frac{1}{4}$ miles, has a rise of 120 feet; thence to Clay-hall, $2\frac{1}{4}$ miles, has a rise of 62 feet; thence along the summit-pound and through the deep-cutting to Travis-mill, $5\frac{1}{4}$, is level; thence to the *Calder and Hebble* navigation, $11\frac{1}{2}$ miles, has a fall of 275 feet; the Hollingwood and Rochdale branches are level. From near Rochdale to Sowerby-Bridge there are 49 locks, (which are of the same width and length as *Bridgewater's* at Run-corn:) more than 60 bridges and 8 aqueducts and large culverts. At Hallin's mill is a tunnel of 70 yards in length, 17 feet high and 21 feet wide, with a towing-path through it. At Dean-Head, between Littleborough and Todmorden, is a stupendous deep-cutting in hard rock, some of it 50 feet deep. A very large reservoir is made on the west side of the summit, and an 100 horse steam-engine is used to pump the water up to the summit-pound. On a bog on Blackstone edge are two other large reservoirs, one of them 14 yards deep. Gauges for regulating the streams of the Roch, Irwell and Irk rivers, so that only their surplus flood-waters are taken for the supply of this canal, were contrived and erected by Mr. *John Rennie*, the engineer. Steam-engines within 20 yards of the canal are allowed to condense by its water. On the 28th of December 1798, the east end of the line from Sowerby bridge to Rochdale was completed; on 18th September 1802, it was continued to Lome-side wharf; and on 21st December 1804, the whole line was completed and opened to Manchester. This company are to pay a compensation to the duke of *Bridgewater* for his warehouses at Castle-Field, and to the *Calder and Hebble* company for their warehouses at Sowerby bridge. This company were authorized by their first act to raise 391,000l. (the amount of shares 100l. each) and by the last act they were authorized to raise a large sum in addition. The rates of tonnage and wharfage, and the exemptions in the first act, will be found in *Phillips's 4to. History*, pages 157 and 159, to 161; also, by the second act, certain additions were made to these tolls. Cuts or rails-ways may be made to any present or future coal-mines near the line. In 1791 a branch from this canal was proposed from near Todmorden (104 feet below the summit-level) to 2 miles beyond Colne, having a tunnel thereon of $1\frac{1}{4}$ mile in length, about 3 miles N. E. of Todmorden.

ROTHER RIVER. The general direction of this river is nearly N.W. by a crooked course of about 19 miles in the counties of Sussex and Kent; it is but little elevated above the sea in any part: its objects are the import of coals, &c. and the export of oak-timber and agricultural products: near Rye harbour, opposite to Pleydon-heights, it is joined by the *Shorncliffe and Rye* canal. Rye, Winchelsea, Appledore, and Tenterden are considerable towns on or near to this navigation; which commences in the tide-way of the English Channel near Rye old harbour, and terminates at Roberts-bridge; it has a branch of about $2\frac{1}{2}$ miles to Winchelsea bridge, and some other navigable branches in the level fens which surround Oxney Island, and adjoin Romney-marsh. The harbour of Rye near the mouth of this river, from its tendency to choke up, formerly employed the abilities of captain *John Perry*, Mr. *John Smeaton*, and other eminent engineers; and under the acts of 29 Geo. I. and 1, 37, and 41 of Geo. III. several works have

been constructed. Previous to the reign of Edward I., it is said, that the *Rother* vented its waters into the sea at old Romney harbour, about which time a new channel was cut for it to sea at old Rye-harbour, which for a long time scoured itself out, and was deep enough for the use of large vessels, the tide flowing 24 miles up the river; but sea-fluices being afterwards erected in improper situations, and embankments made, by which (before 1698) the channel became too shallow for ships, and in 1719 it was rendered quite useless for navigation; soon after 1721, the sluices above mentioned were removed, but the evil was become so irreparable, that captain *Perry* advised, and effected the cutting of, an entire new channel of about a mile in length, 150 feet wide at top, and 70 at bottom, since called the new harbour (from the sea, near 2 miles west of the old harbour) into the channel of the Winchelsea river, and through that to the *Rother* and old harbour at Rye; this new canal (finished 14th July 1762) had about its middle part, a stone sluice of two openings, one for the passage of vessels, and the tide near high-water, 40 feet wide, shut by double gates pointing to Landward, and another of 30 feet wide, closed by 5 draw-gates, to be occasionally opened for scouring the mouth of the new channel or harbour, at which there were two stone piers erected at 120 feet apart. The upland and tide waters continued to have their course to sea by the old channel or harbour, and Mr. *Smeaton* who was consulted in 1763, confidently foretold, that unless the old channel was closed up near Rye, below the entrance to the new one, so as to turn the upland waters through the new harbour, it would be in time quite silted up, as happened so completely previous to 1797, that an act then passed repealing all the former acts relating to this new harbour, and the tonnage which coasting vessels had paid since it was established, on passing or entering the same, was transferred to Ramsgate harbour, near *Stour* river, into which such ships are able to run for shelter, in case of a storm coming on. The new Rye-harbour was in consequence blocked up, by a bank below the Winchelsea river, over which the new road between Winchelsea and Rye now passes: soon after this, the *Rev. Daniel Pape* revived the ideas of Messrs. *Perry* and *Smeaton*, with regard to the entrance of the old harbour, and by the assistance of Mr. *Sutherland*, cut a new channel, or sea vent, for the river, about $\frac{1}{4}$ of a mile west of the old harbour's mouth, and being about $\frac{3}{4}$ of a mile in length, before it intersected the old harbour: at this place Mr. *Pape* constructed a dam of straw, faggots, and gravel, which effectually blocked up the old harbour's entrance, and forced the tide to enter and return, and the river waters to vent themselves through his new cut (as Mr. *Smeaton* had in vain before recommended to be done with Mr. *Perry's* new cut.) After which, Mr. *Sutherland* constructed a pier-head on the east side, and two jetties on the west side of the present entrance to the harbour, which is now said (see *Transactions of the Society of Arts*, vol. xxii. p. 249.) to be capable of admitting ships of 250 and 300 tons burthen at spring tides, which here rise 23 feet, and the neap tides 14 feet. In December 1799, it was proposed to improve the navigation of this river between Rye and Robertsbridge, to extend the navigation of the Winchelsea branch to Siddlescombe, and to make a new navigable branch from Blackwall to Smallhithe near Tenterden. In April 1802, this last branch was proposed to be joined by the intended *Medway and Rother* canal.

Sandbach Canal. In the year 1793, a canal was proposed to be made from the *Severn* river below Shrewsbury to the *Trent and Mersey* canal at Sandbach, with a cut to Betley, and another to join the *Chester* canal near Nantwich. The *Ternbridge and Winsford*, and the *Newport and Stone* canals, have

have at different times been proposed through parts of the same tract of country.

SANKEY CANAL. Acts 28 of Geo. II. and 1 of Geo. III. —The general direction of this canal is nearly N.W. by so very bending a course, that it exceeds a semicircle; its length is $12\frac{1}{2}$ miles in the county of Lancaster; it is not very greatly elevated in any part: its objects are the export of coals and slates, and the supply and trade of St. Hellens and Newton, and the copper, glass, and other works near them; near Sankey bridge it connects with, and is crossed by the side-cut made in 1804 for avoiding the shallows in the *Mersey* between Warrington and Runcorn. Warrington is the 45th British town, with a population of 10,567 persons; Newton and St. Hellens are also considerable towns near, or on this canal; which commences in the *Mersey* and *Irwell* navigation at Fiddlers-ferry, and terminates near Sutton-heath collieries. Near the mouth of Sankey brook it has a short cut of about $\frac{1}{4}$ of a mile, forming another communication with the *Mersey* river; there is a branch of about $\frac{3}{4}$ of a mile to Penny bridge, and another of $\frac{1}{4}$ of a mile to Gerrard's bridge. From the *Mersey* to Sutton heath is a rise of 78 feet, by 8 six-feet locks, and 2 double locks of 15 feet rise each. The highest spring tides rise within about a foot of the level of the water at the first lock. Vessels deeply laden were generally unable to pass into or out of the *Mersey* for two or three days of neap tides before the *Mersey* cut above mentioned was made. This canal is 48 feet wide and $5\frac{1}{2}$ feet deep in water; it has 18 bridges, all of which are wooden swing-bridges, even for the great turnpike road between Manchester and Liverpool. Between St. Hellens and Sutton-heath there is a short tunnel; the canal is fed by a feeder from Sankey brook, and there are provisions for enabling the farmers near this canal to irrigate therefrom, between the 10th of October and 1st of May annually. Mr. *John Eyles* was the engineer, and has the honour of completing this, the *first English canal*, that was attempted; it was opened between the *Mersey* and Gerrard's bridge in the year 1760. The sum of money to be raised for the purposes of this canal is not limited in the acts, as is done in all modern canal acts. The proprietors are authorised to take 12d. per ton on all goods which are navigated on any part of their canal, except limestone, road-materials and manures, which are toll free: 63 cubical feet of coal, cannel, charcoal, coke, or cinders, are to be rated as a ton, and a bushel of coals is to be heaped measure in a vessel $19\frac{1}{2}$ inches diameter outside, and capable of containing one bushel and one quart of water Winchester measure. In June 1797, a loaded barge was rowed 20 miles on this canal by a machine worked by a steam-engine on board of the barge, as before mentioned.

Selby and Leeds. In 1769, Mr. *James Brindley* surveyed the line of a canal from the *Ouse* river at Selby to the *Leeds and Liverpool* canal (near to the termination of the *Ayre and Calder* navigation) at Leeds: it was proposed to pass Thorp dam, near to Thorp hall, Hambleton, Hillham, Burton-Salmon, (where a tunnel was intended,) near Fairburn, Newton, the Fire engines, and cross the *Ayre* river, by Thwait mill, Hunstet, and so on to Leeds, a course of 23 miles in length: the opposition of the *Ayre and Calder* company, who were in the reign of William III. indulged with very high rates of tonnage, and some other persons, proved fatal to this scheme when it came before parliament.

SEVERN RIVER. Acts 19 Hen. VII., 23 Hen. VIII. and 12 and 43 of Geo. III. —The general direction of this noble river is nearly north, by a crooked and bending course of about 174 miles, skirting the counties of Somerset, Gloucester, Glamorgan, Monmouth, and Hereford, and

through the counties of Worcester, Salop, and Montgomery: commencing in the tide-way in the *Bristol Channel*, at Flat-Holm light-house, and terminating in the *Montgomery* canal at Welshpool. Its northern end is considerably elevated: the trade of various kinds is very immense on this important river, and the many navigations which connect therewith. At the lower layer it is joined by the *Glamorganshire* canal and *Cardiff and Merthyr-Tydvil* railway; at New Amsterdam by the *Sirhowy* railway; at Nash by the *Ufke* river; (not far from its junction with *Monmouthshire* canal, and a branch of *Sirhowy* railway); at King's Road by the Bath *Avon* river; at Beachley by the *Wye* river; at Berkley-Pill, Hotch-Crib, and at Gloucester by the *Gloucester and Berkley* canal; at Framiload by the *Stroudwater* river and canal; at Gloucester, on each side of Alney Isle, and at Laffington by the *Hereford and Gloucester*; at Fletcher's leap with *Coombe-hill* canal; at Tewksbury by the *Stratford Avon*; at Diglis by the *Worcester and Birmingham*; at Hawford by the *Droitwich* canal: at Stourport by the *Stour* river and *Staffordshire and Worcestershire*, and the *Leominster* canals; at Coal-port and at Loads-croft near Coalbrookdale, by the *Shropshire* canal; and at Shrewsbury by the *Shrewsbury and Ellesmere* canals. Bristol is the 7th British town, with a population of 68,645 persons; Shrewsbury the 36th, with 14,739 persons; Worcester the 40th, with 11,352 persons; and Gloucester the 72d, with 7,579 persons; Cardiff, Newport, Chepstow, Thornbury, Berkley, Newnham, Tewksbury, Upton, Bewdley, Kidderminster, Bridge-North, Much-Wenlock and Welshpool, are also considerable towns near to, or upon this river. The falls which this river has in particular parts have been mentioned in a preceding part of this article, as also a valuable experiment of 11 years continuance on the floods, droughts, and frosts which affected its navigation; which is unassisted by any locks, side-cuts, weirs, or other erections, except the towing-paths, which Mr. *William Reynolds* begun between Coalport and Coalbrookdale, in consequence of an act, 12 of Geo. III., since renewed, for making a towing-path between Coalbrookdale and Bewdley bridge, and levying certain tolls on goods navigated on that part of the river for defraying the expences of such path, which has been since completed; and in 43 of Geo. III. a similar act for making a towing-path from Bewdley bridge to the *Worcester and Birmingham* canal at Diglis below Worcester, which is, we believe, also completed. The trade on the middle parts of this river is carried on by two sorts of vessels, viz. barges 40 to 60 feet long with a single mast and square sail, carrying from 20 to 40 tons, and trows with a main and top-mast about 80 feet high, and square sails; these are 160 feet long and 16 to 20 feet in width, and carry 40 to 80 tons. Some years ago, Mr. *John Wilkinson* introduced some barges made of cast iron plates for navigating this river. In the 16 Geo. III. an act was obtained for erecting a cast-iron bridge of one arch (the first ever erected; see our article *BRIDGE*) over this river at Brosely or Madeley wood near Coalbrookdale. The high floods, in 1795, carried away a narrow and inconvenient stone bridge that was at Buildwas, about 2 miles above Madeley wood, and in 1796, a new cast-iron bridge was erected in its stead, as before described: by an act of the 17 Geo. III. a new stone bridge was erected over this river at Gloucester, by which the navigation there was much improved. At Shrewsbury the very long and curving loop of the river is tunneled through by a small arch for conveying water to several mills at its junction again with the river. In the year 1765, the *Ternbridge and Windsford* canal was proposed to join this river at Ternbridge; in 1786 the *Stourbridge and Worcester* was proposed to join at Diglis; in 1793, the *Sandbach*, and another

another canal in opposition to the *Ellesmere* (called, in some maps, the Eastern Grand Trunk,) were proposed to join this river below Shrewsbury. In 1793, the *Welshpool and Leominster* was intended to join at Welshpool; in 1797, the *Bristol and Gloucester* was proposed to join, both at Gloucester and at Worcester, to this river; and, in 1801, the *Severn and Wye* railway was proposed to join this river at Lidney.

Severn and Wye Rail-way. In the year 1801, a line of rail-way was projected from the *Severn* river at Lidney, across the forest of Dean, connecting with the collieries thereon, and extending to the *Wye* river at English Bichnor, we believe. At a meeting, on the 14th of June, 1802, the southern part of this design was relinquished, and the *Dean-Forest* rail-way was proposed in lieu of the other part.

SHANNON RIVER, (Ireland). The general direction of this famous river is nearly N.E. by a crooked course of more than 100 miles, between the counties of Kerry, Limerick, Clare, Tipperary, Galway, King's county, Meath, Longford, Elphin, and Leitrim in Ireland. It commences in the Atlantic Ocean, at Loop-head, and terminates at Carrick on the Shannon, which is 65 miles above Banagher. It is joined by the *Grand Canal* at Tormanbury, and it also is joined by the *Limerick canal*. Limerick, Kilaloe, Clonfort, Leitrim, Carr, Longford, Roscommon, Athlone, Portumny, Nenagh, Askeaton, Clare-Abbey, &c. are considerable towns on or near to this river. About the year 1750, the improvement of the navigation on this river was attempted, by the erection of sluices with gates on its stream, for damming up and making flashes for the boats to pass through with. The Irish parliament, at different periods, between 1753 and 1771, granted several sums of the public money, amounting to 39,160*l.* for the improvement of this navigation. It was not until about March 1804, that the upper part of the navigation on this river was completed.

SHORNCLIFF AND RYE CANAL. Defence act 43 Geo. III.—The general direction of this singular canal is nearly S.W. by a bending course of about 18 miles, through Romney marsh in the counties of Kent and Sussex. It is so nearly level with the sea as to require no locks but the tide-locks at its extremities. Its objects, besides aiding the defence of this part of our coast, is the import of coals and sea-beach for road-making; the export of farming products, and improving the drainage of the marsh: Hythe, Rye, Appledore, and Folkestone are considerable towns near this line; which commences in the tide-way of the English channel at Shorncliff battery near Hythe, and terminates in the tide-way of the *Rother* river opposite Pleydon Heights near Rye. This canal is of width and depth sufficient for vessels of 200 tons to navigate; it has a military road by its side, and is flanked throughout with batteries of great strength. This canal was projected by the royal military engineers, in the autumn of 1804; and in June last (1805) 3000 men were said to be employed thereon, and before now it is, we believe, completed.

SHREWSBURY CANAL. Act 33 Geo. III.—The general direction of this canal is nearly E. by a crooked course of 17½ miles in length, in the county of Salop: its eastern end is greatly elevated, and at no great distance from the grand-ridge on its western side; its objects are the export of coals from its eastern end, for the supply of Shrewsbury, and supplying the same with farming products, and the country with lime and manures; at Wombridge it is joined by the *Ketley* canal. Shrewsbury is the 36th British town, with 14,739 persons. This canal commences in Castle Foregate basin, at the town of Shrewsbury, (near to the *Ellesmere* canal, with which it may be joined by mutual consent,) and terminates in the *Shropshire* canal above Wrockandire-wood plane near Oaken-gates. From Shrewsbury to Langdon,

near 12 miles, is level; thence to near Wombridge, 4½ miles, is a rise of 79 feet, by locks; thence is an inclined plane of 75 feet rise, and near ½ of a mile in length, to the *Ketley* canal; thence (along the part which was purchased by this company of Mr. *William Reynolds* for 840*l.* being half of what it cost) to the *Shropshire* canal, 1½ mile, is level. The locks on this canal are contrived in two divisions by doors, which draw up, out of a recess formed for them below the locks, so that a long narrow canal boat of the usual construction, or two or four smaller and narrow flat-bottomed boats adapted to the inclined-plane, can pass the same without unnecessary waste of water. Near Atcham is a tunnel of 970 yards in length, and 10 feet wide, which has a towing-path 3 feet wide through it, constructed of wood, and supported on bearers from the wall, so as not to diminish the water-way. At Long is a long embankment and an aqueduct bridge, or rather trough of cast iron, over the *Tern* river, 62 yards long, and 16 feet above the level meadows, of which we have already given a description in this article; at Roddington are another embankment and a common aqueduct bridge, 21 feet above the surface of the *Roden* river, over which the canal passes, and at Pimley there are another embankment and aqueduct of less height and width than the former ones. At Wombridge there is a double *inclined-plane* of 223 yards in length, and 75 feet perpendicular rise, up one of which, empty or partly laden boats are drawn by the aid of a steam-engine, or by the descent of a loaded boat at the same time on the other, as we have before described. Mr. *Thomas Telford* and Mr. *William Reynolds* were the engineers employed or consulted on the construction of the works on this canal. In March 1796, the Long aqueduct was finished; and in February 1797, the whole line was completed and opened. This company was authorized to raise 70,000*l.* the amount of each share being 100*l.* The rate of tonnage is 2*d.* per ton per mile on all goods, and 1*d.* per ton for passing the inclined-plane; manures, except lime, being exempt on the pounds, but not to pass the locks when the water is ½ an inch under the lock-weirs. The profits of this concern are not to exceed 8 per cent. on the capital, after which the toll on boats for passing the plane is to be first lowered or taken off. The act in providing for the purchase of 1½ mile of Mr. *Reynolds's* *Ketley* canal as above, requires him to pay 2*d.* per ton per mile afterwards for navigating the same, as above. Less than 8 tons in a boat, except in returning, is to be paid for as such.

SHROPSHIRE CANAL. Act 28 Geo. III.—The general direction of this canal, or rather system of water-levels and inclined-planes, is nearly north, about 7¾ miles, in the county of Salop: its northern end is greatly elevated, and at no great distance from the grand-ridge on its western side; its objects are the export of coals and iron, and the carrying up of lime-stone. It communicates near Oaken-Gates with the *Shrewsbury* canal; it has no large town near it. It commences in the *Severn* river at Coal-Port, (a new town established by the late excellent Mr. *William Reynolds*, whose rapidly increasing manufactories in the year 1800 employed 400 persons,) and terminates in the *Donnington-Wood* canal at Donnington-Wood. It has a branch from Southall Bank, which proceeds to Brierly Hill near Coalbrook-dale (2¾ miles), and thence is continued by an inclined plane and railway below, to the *Severn* at Loads-Croft, near the Brosley iron bridge. There is also a short rail-way branch to Horse-Hay iron works. At the *Severn* river at Coal-Port (formerly called Sheep-wash Meadow) there is a flood-lock, which rises sufficient to clear the highest floods in the river, parallel to which the canal proceeds on a level, ¾ of a mile, to near Hay, where is an inclined plane of 350 yards long and 207 feet

feet perpendicular rise; thence to near Windmill Farm, $1\frac{1}{4}$ mile, is level canal, where is another inclined plane of 600 yards in length, and 126 feet perpendicular rise; thence to the Brierly branch at Southall-Bank, $2\frac{1}{2}$ miles, is level canal; thence to the *Shrewsbury* canal at Oaken-Gates, 3 miles, is level; thence to near Wrockardine-Wood, $1\frac{1}{4}$ mile, is also level: at this place is a third inclined plane, of 320 yards in length and 120 feet perpendicular fall: thence to the *Donnington-Wood* canal, 100 yards, is level. The boats are shallow, and carry 5 tons. There are no locks on this canal, which is supplied with water by two small reservoirs which lie above the canal, and two others below its level, the water therefrom being pumped up by the steam engines belonging to the inclined planes; the waters which are lifted from the mines contribute also materially to the supply of the different lengths of canal. The three great inclined planes at Hay, Windmill, and Wrockardine, have each a short inclined plane descending from their tops into the upper canals, up which the boats, on a proper wheeled carriage, are dragged by the steam-engines, working the wheels, drums, and ropes, and are, by the ascent of another boat, or the operation of a brake-wheel, let easily down the long plane, as has been particularly described already in this article. At Brierly-Hill the crates or iron baskets of lime-stone were drawn up, and the coals in boxes were let down, through perpendicular shafts, 120 feet deep, by ropes winding on a drum above; but several years ago this plan was laid aside, and an inclined plane, similar to the three others above, except that it has no steam-engine, has been adopted, as before mentioned. Six boats have been passed down, and as many taken up, the Windmill plane of 600 yards long, in the course of a single hour; the steam-engine and 3 men only being employed. It is said that only 3d. is charged for letting down a loaded boat, and empty ones are returned gratis. Mr. *William Reynolds* and Mr. *Henry Williams* were the engineers; and the works were completed, and the canal opened in the year 1792; it is said to have cost only 47,500l. The rate of tonnage is 2d. per ton per mile on all kinds of goods. In the year 1797, the tolls produced a net profit of 6 per cent. on the capital.

SIRHOWY RAIL-WAY. Act 42 Geo. III. (for *Monmouthshire canal*).—The general direction of this rail-way or tram-road is nearly N. W., for about 28 miles, in the counties of Monmouth, and of Brecknock in South Wales: its northern end is much elevated: its object is the export of coals and iron from the rich mineral country through which it passes: at Court-y-billa farm, and at Risca, it is joined by rail-way branches of the *Monmouthshire* canal. Newport is a considerable town near its southern extremity: it commences at the *Uffe* river, near Pill-Gwenilly (opposite the commencement of the *Monmouthshire* canal), and terminates at Trevil lime-stone quarries, in the parish of Llanguinider; and it has a branch to Rumney union iron works; the line passing through Sirhowy and Tredegar iron works, and through Tredegar park; it was said also, that a branch of the rail-way was to be conducted from near Tredegar park to the meadows near the *Severn* river, where a new sea-port town, to be called New Amsterdam, was laid out and begun. This company were authorised to raise 45,000l., the amount of their shares being 100l., and they have engaged to pay 110l. annually to the *Monmouthshire* canal company, on condition of their constructing the first 9 miles of this tram-road nearest to *Uffe*; sir *Charles Morgan* is to make 1 mile in length of the same through his park at Tredegar, and receive the tolls thereon; and Messrs. Samuel Homfray, Richard Fothergil, Matthew Monkhouse, William Thompson,

William Forman, and other iron-masters, are also to construct particular parts of this concern. It was provided, that if these several parties failed to execute their several parts of the line, previous to Michaelmas day 1803, that the act, as far as relates hereto, should be void. A new turn-pike road is made by the side of this rail-way for 21 miles: the ascent of the rail-way is so easy and regular that one horse can draw 10 tons down the line, and return with the empty trams. A new town was laid out and begun at Tredegar new iron works, near Sirhowee.

SLEAFORD NAVIGATION. Act 32 Geo. III.—The general direction of this navigation is nearly west, for about 12 miles, in the county of Lincoln; it is but little elevated above the sea, the greater part of it being embanked on both sides through level fens: its objects are the supply of Sleaford and the surrounding country with coals, deals, &c., and the export of farming produce. Tattershall and Sleaford are considerable towns near this navigation. It commences in the old *Witham* river at Chapel-Hill (not far from the commencement of *Horncastle* canal), and terminates at the cattle-causeway near Sleaford. The locks are 60 feet long, and 15 feet wide in the clear; the width of the canal is 30 feet at top, 18 at bottom, and four feet deep, except the summit pound from Haverholm mill to Sleaford, which is to be 5 feet deep, to make a reserve of water, which is to be supplied from the fens above the navigation in New Sleaford. This company was authorised to raise 23,000l., the amount of shares 100l. each. The tolls are various for different parts of the line. See *Phillips's* 4to. *History, Appendix*, p 26. Lime, manures, and road-materials pay only half the rates of other articles. The profits of this concern are limited to 8 per cent. and after 1000l. is accumulated as a fund for contingencies, the tolls are to be lowered. This company are to join with the *Horncastle* canal company, in the expence of improving the old *Witham* river between Lincoln high bridge and the *Foss-dyke* navigation at Brayford-Meer; in consequence of which only half the usual tolls on the old *Witham* are to be taken, on goods passing to or from these navigations.

SOHAM LODGE. The direction of this navigable cut or lode is nearly S. E., for about 4 miles, and is embanked through the level fens in Cambridgeshire: it commences in the great *Ouse* river, near Barway chapel, and after passing through Soham-Meer, terminates at the town of Soham: its objects are the supply of coals, &c. to Soham, and the export of farming products.

SOMERSETSHIRE COAL CANAL. Acts 34, 36, and 42 Geo. III.—The general direction of this canal is nearly S. W., for about 10 miles, besides a principal branch of $7\frac{1}{2}$ miles nearly parallel thereto, in the county of Somerset: its western ends are considerably elevated: its object is the export of coals from the mines north of Mendip hills. Bath is the 12th British town, with a population of 32,200 persons, and Bradford the 78th., with 7,302 persons, which are the only large towns near this canal; which commences in the *Kennet and Avon* canal, at Monkton Coombe, and the main or Dunkerton line of canal terminates at Paulton; but a rail-way continues it forwards to Tynning; the Radstock line or branch of canal proceeds from the last at Mitford mill, and terminates at Radstock town; but a rail-way continues it forwards to Welton colliery; there are also rail-way branches from this line to Radstock colliery, and to Smallcombe and Clandon collieries: from the main or Dunkerton line, there are rail-way branches to Mearns, Amesbury's, Britton's, Salisbury's, and Radford collieries. From the *Kennet and Avon* canal to Mitford mill is level, thence the main or Dunkerton line rises

rises 138 feet by 22 locks. The Radstock line rises about the same height from Mitford mill. The boats used are 72 feet long, and 7 feet wide. About July 1796, Mr. Robert Weldon began the erection of one of his diving or caisson locks at Coombe-Hay, for passing the boats through a perpendicular shaft, either in ascending or descending. In November 1797, this apparatus was in sufficient forwardness for the caisson to be sunk and raised again in the shaft; and, in May 1798, a trial was made of this contrivance, so successful, that the inventor then offered to undertake to pass 1500 tons of goods in 12 hours through this 45 feet rise or fall, without the loss of any considerable quantity of water, and with the assistance of only one man, besides the bargemen, to work the machinery. These fair prospects were, however, blasted, by the bulging of the walls of the shaft, as we have already mentioned, in describing this contrivance; and inclined planes were constructed at this place for letting down boxes full of coals, the descent of which, by means of ropes and wheels, drew up the boxes, either empty, or in part loaded with other goods: the delay and expence of this method being highly complained of, about September 1802, a new subscription was set on foot, and encouraged by the *Kennet and Avon* and *Wilts and Berks* companies, for substituting locks, 22 of which were completed, and opened on the 5th of April last (1805). Mr. John Rennie, Mr. William Bennet, Mr. Charles Wedge, and Mr. William Smith were the engineers consulted or employed upon this canal, which, in January 1801, was completed from Dunkerton to several of the coal mines, and which, (after 4 miles of land carriage,) had the effect of lowering coals at Bath from 14d. or 15d. per cwt. to 9d. or 10d. This company was authorised to raise 185,000l., the amount of shares 100l. each. Before undertaking any of the rail-way branches to the collieries, this company might require security from the owners of such collieries, that the tolls thereon should produce, or be made up, to a certain rate of interest on the cost of such branches. The profits of this concern are not to exceed 10 per cent.; but after 1000l. is accumulated and placed in government securities, as a fund for contingencies, the tolls on coals are to be lowered. Husbandry and pleasure boats 12 feet long and 5 feet wide may be used toll free on the pounds, or where the water flows waste over the lock-weirs. A tunnel, $\frac{3}{4}$ of a mile long, was at first proposed near Coombe-Hay, but by a subsequent alteration of the line this was avoided. The rates of tonnage in the first act may be seen in *Phillips's 4to. History*, App. p. 163 and 164, including the tolls on horses, cattle, sheep, &c. travelling on the rail-ways; by the last act some of the tolls were increased. Dunkerton mill was purchased by this company, and steam-engines were erected to pump up water for supplying the upper pounds. In several places this canal was cut through *strata* disposed to slip, but by the small tunnels or soughs which Mr. William Smith constructed, for draining off the springs, the same was prevented. On the 3d of May, 1804, a sudden and great flood happened, which required, it was said, some of the banks of this canal to be cut in proper places, to give vent to the water.

SOUTHAMPTON AND SALISBURY CANAL. Acts 35 and 40 of Geo. III.—The general direction of this canal is nearly N.W. for about 17 miles, in two detached lengths, in the counties of Hants and Wilts; it is not greatly elevated; its objects are the trade between Southampton and Salisbury, the supply of these towns, and the export of the surplus farming products of the intermediate country. This canal commences in the *Itchin* river, at Northam near Southampton, and proceeds along the N. E. shore of *Southampton water*

to the *Andover* canal at Red-bridge. In the *Andover* canal (about $9\frac{1}{2}$ miles above Red-bridge), near Kimbridge mill, this canal commences again, and proceeds to the *Avon* river at Salisbury, or New Sarum. Southampton is the 68th British town, with a population of 7,913 persons, and Salisbury is the 70th, with 7,768 persons: Romsey is also a considerable town near this line. The eastern part of this canal, between Northam and Red-bridge is level, and but little elevated by its tide-locks, above the tide-way in *Itchin* river and *Southampton Water*; from its skirting along close to the shore of the latter river, it was that that facetious satirist *Peter Pindar* took occasion to burlesque "Southampton's wife sons." Upon this part of the canal there is a tunnel of considerable length close to, and indeed under part of the north end of Salisbury town; considerable difficulties seem to have attended the making of this tunnel, owing to the looseness of the soil; and the quick-sands at the foot of the cliff, by the side of *Southampton Water*, have also proved a very serious obstacle. An aqueduct is built over Shirley Brook; springs within 1000 yards of the canal may be taken for its supply, which is also to be aided by some reservoirs, which were begun in 1796. This company have been authorised to raise 96,000l. the amount of each share being 100l. Mr. John Rennie is the engineer; the eastern part of the canal was begun in 1796, and was said, in 1803, to be nearly done, but it is not yet opened. The western part from the *Andover* canal at Kimbridge was completed to Deane, in October 1798. Stones are to be erected on the banks of this canal, at every $\frac{1}{4}$ of a mile distance.

SOUTHAMPTON WATER. Acts 11 Henry VII. and 18 Henry VIII.—This noble estuary of the Anton and other rivers has a N.W. direction for about 10 miles in Hampshire. The tide flows through its whole length, and through a branch thereof more than 5 miles in length to near Botley; *Southampton water* is navigable for large ships; it commences in the channel between Hampshire and the Isle of Wight at Calshot Castle, and terminates near Red-bridge where it is joined by the Anton river (formerly navigable near 6 miles to Romsey), and the *Andover* canal near one of the terminations of the *Southampton* and *Salisbury* canal; near Salisbury it is joined by the *Itchin* river, (about $\frac{3}{4}$ of a mile from the commencement of the *Southampton* and *Salisbury* canal.) In the 43d of Geo. III., an act passed for enlarging and improving the quay and harbour of Southampton, by building a pier and other works which commenced in December 1803, and have since been proceeding.

STAFFORDSHIRE AND WORCESTERSHIRE CANAL. Acts 6, 10, and 30, of Geo. III.—The general direction of this canal (sometimes called the Wolverhampton canal) is nearly north for $46\frac{1}{2}$ miles in the counties of Worcester and Stafford; its middle part is very considerably elevated, and it crosses the grand-ridge without a tunnel; its trade in the export of coals, pottery-wares, hard-wares, &c. is immense, besides the general trade between the *Severn*, the *Mersey*, and *Trent*, which for a long time passed exclusively through it. Near to Stourton, and to Stewponey, it is joined by the *Stourbridge* canal, and at Aldersley or Autherley by the Old *Birmingham* canal. Wolverhampton is the 33d British town with 12,305 inhabitants, and Kidderminster is the 95th with 6,110 persons: Bewdley, Stourbridge, Penkridge, and Stafford, are also considerable towns on or near to this canal; which commences in the *Severn* river at Stourport, and terminates in the *Trent and Mersey* canal at Great Haywood. From the *Severn* river at Stourport, to the *Stourbridge* canal at Stewponey, $12\frac{1}{4}$ miles, is a rise of $127\frac{1}{2}$ feet by 13 locks; thence to Tettenhall, the beginning of

of the summit-pound, 11 miles, is a rise of $166\frac{1}{2}$ feet by 18 locks; thence to the old *Birmingham* canal, $1\frac{1}{4}$ mile, is level; thence to Street-way, $8\frac{3}{4}$ miles, is level to the N. end of the summit-pound; thence to the *Trent and Mersey* canal at Haywood, $13\frac{1}{4}$ miles, is a fall of $100\frac{1}{2}$ feet by 13 locks. This canal is 30 feet wide at top, and 5 feet deep, though the depth of water on the lock-fills is only 4 feet. The locks are 74 feet long and 7 feet wide; and several of them are built of a red kind of free-stone; the boats in general carry 20 tons. At Stourport are two basins belonging to this canal connected with the Severn river by flood-locks to keep the water in them always at one certain height. On this canal are three short tunnels; one is near to Stewponey, the other at Whitlington, and the other is an arched-way under part of the town of Kidderminster; at which place there is an aqueduct-bridge over the Stour river, another at Prestwood on Wordley brook, another near Milford on the Sow river, and another at Haywood mill over the Trent river. In Chillington is a large reservoir, and at Moseley another, whose waters are conveyed to the summit-pound by feeders of considerable length. This company may make branches to any place within 1000 yards of the line by consent of the land-owners. Mr. *James Brindley* was the engineer to this canal, which he began in September 1766, and finished in 1772. The first lock which this engineer erected was at Crompton, on this canal. This company were authorised to raise 100,000l., the amount of each share being 100l. In September last (1805), the yearly dividend on these was stated to be 24l. The rates of tonnage are stated (in Mr. *John Cary's* excellent work with maps, now publishing in numbers, on Inland Navigation,) to be $1\frac{1}{2}$ d. per ton (2400lb.) per mile on all kinds of articles except lime and lime-stone, which pay only $\frac{1}{2}$ d. per ton; and paving and road materials, and manures for adjoining lands which are to pass toll free on the pounds, and through the locks when the water flows over the lock-weirs. By the *Dudley* act (16 Geo. III.), coals brought from that canal and carried on this may be charged 2d. per ton per mile, but commissioners may authorise lowering this toll. The usual charge made by barge-men in 1796 for freight (including the company's tonnage) was, for perishable goods $2\frac{1}{2}$ d. per ton per mile, and for heavy unperishable goods 2d. In 1802, a tunnel 5 feet in diameter and 135 feet long, composed of cylinders of cast-iron, was laid under the river Penk near this canal for draining a morass of 500 acres. In the last sessions (45 Geo. III.) application was made by this company for a new act, to raise the tolls in order to make new locks, the old ones in some places being decayed and nearly worn out, and for making some new rail-way branches. The *Stour* river between Stourport and Stourton, by the side of this canal, was made navigable several years ago, but the works thereon were soon after destroyed by a great flood. In the present month (November 1805), a rail-way branch from Latherford in Sharncliffe is proposed, to Mr. Henry Vernon's collieries in Bushbury.

STAINFORTH AND KEADBY CANAL. Acts 33 and 38 of Geo. III. The general direction of this canal is nearly W.; for 15 miles in the counties of Lincoln and York, it has its course through level fens and is but little elevated above the level of the sea; its objects are the import of coals and export of agricultural produce, with a better drainage of the country through which it passes. Thorne is the only considerable town near this line; which commences in the *Trent* river at Keadby, and terminates in the *Don* river at Fishlake near Stainforth, having also a branch 1 mile in length which joins the *Don* river at Hangman-Hill in Thorne; the whole is on one level, having tide or flood-locks at its ex-

tremities to regulate its height notwithstanding the variable tides and floods in the adjoining rivers. A reservoir of 5 acres is constructed on Thorne Common, and the waste water from this canal is to be discharged into the *Trent*. In 1762, when Mr. *John Smeaton* was consulted about the drainage of Potterick Car, a navigable canal through these fens was in contemplation. This company were authorised to raise 54,200l., the amount of shares being 100l. each.

STOKE RIVER. The direction of this river (sometimes called the *Winton*) is W. for about $8\frac{1}{2}$ miles in the county of Norfolk; it is embanked nearly its whole length through the fens, and is but very little above the sea; its objects are the import of coals, deals, &c. and the export of agricultural products. Downham is the only considerable town near it; it commences in the Great *Ouse* river between Denversluice and Salters-Load, and terminates at Stoke-Ferry near the town of Stoke.

STORT RIVER. The general direction of this river is almost N.E. by a bending course of about 13 miles between the counties of Essex and Hertford; its northern extremity is considerably elevated; its objects are the import of coals, deals, &c. and the export of farming products. Hoddeston and Bishopstortford are considerable towns near this river; which commences in the *Lea* river near Hoddeston, and terminates at Bishopstortford. In 1785, this navigation was proposed to be joined at its northern end by the *Bishopstortford and Cambridge*, and in 1789, it was intended to join the *Bishopstortford and Wilton* at the same place.

STOUR RIVER (Christchurch.) The direction of this river is nearly N.W. for about 35 miles in the counties of Hants and Dorset; its northern end is considerably elevated; its objects are the import of coals, deals, &c. and the export of farming products; Christchurch, Wimborne-Minster, Blandford-Forum, and Sturminster-Newton, are considerable towns on this river; which commences in the tide-way in Christchurch-bay at Christchurch-harbour, and terminates at the town of Sturminster. At Gains-crofts in Shillington-Okeford, it is to be joined by the *Dorset and Somerset* canal. In 1762, Mr. *John Smeaton* was consulted on the intended improvements in Christchurch-harbour; the spring-tides in this harbour flow only 5 to 7 feet, and the neap-tides no more than 4 to 6 feet; and 3 hours after high water there is a second or smaller tide, which flows in the harbour from 8 to 18 inches, being greatest at the neap-tides. In the reign of Charles II., a pier of 256 yards in length, was constructed of lumps of iron-stone out of the loose sandy-cliff near it, and Mr. *Smeaton*, in 1764, planned another pier to be built for the better security of this harbour.

STOUR RIVER (Harwich.) The general direction of this river is nearly W. by a bending course for about 29 miles between the counties of Essex and Suffolk; the first 10 miles is a wide estuary through which the tide flows, the western end is not greatly elevated; its objects are the import of coals, deals, &c. and the export of farming products; Harwich, Manningtree, Neyland, and Sudbury, are considerable towns on this river; which commences in the *Stowmarket and Ipswich* navigation (near its junction with the German Ocean) at Harwich, and terminates at Sudbury.

STOUR RIVER (Sandwich.) Act 7 Henry VII.—The general direction of this river is nearly W. by a crooked course of about 18 miles in the county of Kent; it is but little elevated above the sea in any part; its objects are the supply and trade of Canterbury, and the export of farming products. Canterbury is the 57th British town with a population of 9,000 persons, and Sandwich is the 93d with 6,506 persons, Ramsgate is also a considerable place near to this river; which commences in the English Channel or

Downs at Sandwich Haven ($1\frac{1}{2}$ mile from Ramsgate-harbour), and terminates at the city of Canterbury; the lower end of this river, for $1\frac{1}{2}$ mile in Pegwell bay, has its course through shifting sands which are dry at low water, and covered at high water; it is therefore unsuited for large vessels to enter, and *Ramsgate harbour* is the only secure retreat for ships in case of a storm on this part of the coast. The celebrated piers which form this harbour were begun in 1749; the southern pier extends 800 feet eastward into the sea, it then returns northward, forming the front next the Downs, by a polygon of 5 sides, each 450 feet in length; these are joined at their angles by octagons of solid masonry that are 60 feet across; the breadth of the pier at top including the parapet is 26 feet, and the whole is built of hewn Portland and Purbeck stone. The entrance for ships is from the north nearly, and is 200 feet wide, having a light-house with Argand's reflecting lamps on its west head, and this is connected with the shore by a similar, though short pier, as on the southern side. The area of the famous harbour, thus formed in the open sea, is 46 acres, and it is deep enough to receive ships of 4 or 500 tons burthen. A spacious dry-dock for the repair of ships connects with this harbour. In a few years after the piers were completed, this harbour was nearly choked with mud deposited by the tides. Mr. *John Smeaton*, who was consulted, erected a cross-wall at the uppermost extremity of the harbour with numerous sluices therein, by the drawing of which, after the tide has retired and left this reservoir full of water, the mud has been since effectually scoured out; this excellent engineer also extended the pier 400 feet at the head. Nearly 300 ships have been known at once to assemble in this harbour for shelter on the approach of a storm. An act 5 Geo. III., passed for improving this harbour as above, and by 37 Geo. III. the tonnage charged on vessels passing the English Channel for the support of Rye-harbour, was transferred to this harbour as before mentioned. In the years 1802 and 1804, the *Canterbury and Nicholas-bay* canal was intended to join the *Stour* river at Canterbury; and in 1802, the *Medway and Rother* canal was proposed to join it near the same place.

Stour River (Stourbridge.) Many years ago the *Stour* river from the *Severn* at *Stour-port* to the town of *Stourbridge*, (passing the town of *Kidderminster*), about 14 miles, was made navigable by means of sluices, weirs, and other works; but soon after there happened so sudden and violent a flood as to destroy all these works. The *Stafford and Worcester*, and the *Stourbridge* canals, have since supplied more effectually the place of this river navigation.

STOURBRIDGE CANAL. Acts 16 and 22d of Geo. III. The general direction of this canal is nearly E. by a crooked course of about 5 miles in the county of *Stafford*; its eastern end is considerably elevated, and extends within about 3 miles of the grand-ridge on its eastern side; its objects are the export of coals, iron-stone, &c. and forming part of the communication between the Old *Birmingham* and the *Severn*, &c. *Stourbridge* and *Dudley* are considerable towns near this line; which commences in the *Staffordshire and Worcestershire* canal near *Stourton* and *Stewponey*, and terminates in the *Dudley* canal at *Black-Delph*; there is a branch of near 1 mile to the town of *Stourbridge*, and a branch of 2 miles to *Pensnett-Chase* reservoir, with a side-branch thereto of near $\frac{1}{4}$ of a mile in *Brierly* parish. From the *Stafford and Worcester* canal to near *Stewponey*, $\frac{2}{3}$ of a mile, is a rise of 43 $\frac{1}{4}$ feet by 4 locks; thence to the *Stourbridge* branch, 2 miles, is level; thence to the *Lays*, $1\frac{1}{8}$ mile, has a rise of 148 feet by 16 locks; thence to the *Dudley* canal, $1\frac{1}{2}$ mile, is level; the *Pensnett* and *Brierly* branches are level with the last or summit-pound, and the *Stourbridge* branch is level. The

width of this canal is 28 feet, and the depth of water 5 feet. The *Pensnett-Chase* or *Fen* reservoir is 12 acres in extent, for supplying the head-level of this canal. This company were at first authorized to raise 30,000l. in 100l. shares; the last act authorized calling upon the subscribers for 7,500l. more, by which their shares are now increased to 125l. each. The rates of tonnage will be found in Mr. *John Cary's Inland Navigation*, pages 50 and 51. Goods may be navigated on the summit-level toll free; and road-materials and manures for adjoining lands, may also be carried on any of the pounds toll free. Less than 15 tons are not to pass any lock without consent. Side-branches may be made to the adjacent collieries. The *Worcester and Birmingham* company were bound (act 31 Geo. III.) to make up the profits of this concern to 9 per cent per annum, in case of their canal lessening the trade hereon; but on the extension of the *Dudley* canal to join the *Worcester and Birmingham*, the last mentioned company were exonerated therefrom, and the *Dudley* engaged (33 Geo. III.) to make up the annual dividend on the shares in this concern to 12l. each; but not to exceed 3l., and this when their own canal yielded a dividend of 5l. per share. The part of this canal below *Stourbridge* supplies the place of the river *Stour* navigation, which was destroyed by floods as above mentioned. In 1786, the *Stourbridge and Worcester* was proposed to join this canal at *Stourbridge*; as was also a branch since proposed from the *Worcester and Birmingham*.

Stourbridge and Worcester. In 1786, a canal was proposed, and supported by the late lord *Dudley and Ward*, from the *Severn* river at *Diglis* below *Worcester* city to the *Stourbridge* canal at that place, passing *Bromsgrove*; its proposed length was 26 miles with 772 feet of lockage, by 128 locks; some tunnels and other large works were necessary; a bill for this canal passed the commons, but was rejected by the house of lords.

STOVER CANAL. Act 32 Geo. III.—The general direction of this canal is nearly N.W. for $6\frac{1}{2}$ miles in the county of *Devon*; it is but little elevated; its objects are the import of coals, shelly-sea-sand and lime, as manures, and the export of potters' clay (used in *Staffordshire*, *Lancashire*, &c.) and a peculiar kind of imperfect coal found in small quantities at *Bovey-Tracey*; *Newton Bushel* and *Chudleigh* are considerable towns near this canal, which commences in the tide-way in the *Teign* river at *Newton Abbots*, and terminates at *Bovey-Tracey*, with a branch of $5\frac{1}{2}$ miles to the town of *Chudleigh*. From *Newton-Abbots* to *Newton-Bushel*, 1 mile, is a rise of 20 feet; thence to *Bovey*, $5\frac{1}{2}$ miles, is 30 feet rise; the *Chudleigh* branch is level. *James Templer*, esq. is the sole proprietor of this canal, and Mr. *Gray* was his engineer. At *Teigngrace*, and the adjoining parishes, the surplus water of this canal has been applied to the irrigating of the lands below it, a capital improvement, which we are very anxious to see more generally adopted.

Stowmarket and Bury Rail-way. In December, 1802, it was in contemplation to make a rail-way from the *Stowmarket* and *Ipswich* navigation at *Stowmarket*, to the *Lark* river at *Bury St. Edmunds*, for the purpose of supplying the latter place, and the intermediate country with coals; (the *Lark* navigation being often interrupted by droughts in the autumn;) and for the readier export of farming products.

STOWMARKET AND IPSWICH NAVIGATION. Acts 33 and 45 Geo. III.—The general direction of this navigation (which follows the course of the *Orwell* river) is nearly N.W. for about 26 miles, in the county of *Suffolk*, the first 13 miles, to near *Ipswich*, being a wide channel or estuary in the tide-way, the remainder is not greatly elevated; its objects are the import of coals, deals, &c. and the export of farming

farming products; it is joined by the *Stour* river near Harwich. Ipswich is the 41st British town, with a population of 11,277 persons. Harwich, Needham, and Stowmarket are also considerable towns near this navigation; which commences in the German ocean at Landguard fort, and terminates at the town of Stowmarket. This company were, by an act prior to the above, authorised to raise 14,300l. by the first act above 15,000l. more might be raised; the last act was for improving the port of Ipswich by deepening the same, so that ships might unload at the wharfs, &c. In December, 1802, it was proposed that the *Stowmarket and Bury* rail-way should join this navigation at Stowmarket.

STRATFORD CANAL. Acts 33, 35, and 39 Geo. III.—The general direction of this canal is nearly N. for $23\frac{1}{2}$ miles, in the counties of Warwick and Worcester; it is very considerably elevated, and crosses the grand-ridge: its objects are the export of coals, lime, and paving-stones, and as a link in the great chain of canal communication; at Kingswood in Rowington a branch of this canal connects with the Warwick and Birmingham: Stratford-upon-Avon and Henley are considerable towns on or near this canal, which commences in or near the *Avon* river at Stratford, and terminates in the *Worcester and Birmingham* canal at King's Norton, about 6 miles from Birmingham. From near Hockley there is a branch $2\frac{1}{2}$ miles long to Tanworth quarries; from near Lapworth there is another branch of $1\frac{3}{4}$ miles to the *Warwick and Birmingham* canal; and from near Wilmcote is a branch of 4 miles to Temple-Grafton lime-works, with a branch of about 1 mile from this cut to Aston-Cantelow. From Stratford to near Copnas-hill, $1\frac{1}{2}$ mile, is level; thence to Wilmcote, 1 mile, has a rise of 86 feet; thence to Preston-mill, 6 miles, is level; thence to Preston-green, $1\frac{3}{4}$ mile, is a rise of 76 feet; thence to Lapworth-hall, 1 mile, is level; thence to Hockley Heath, $2\frac{1}{4}$ miles, is a rise of 147 feet; and thence to the *Worcester and Birmingham* canal, 10 miles, is level; the Tanworth branch is level, and connects with the summit-pound: the Temple-Grafton cut is level for the first $2\frac{1}{2}$ miles, and in the next $1\frac{1}{2}$ mile the rise is 20 feet. Near Milepole hill is a tunnel of 320 yards in length; there are several small aqueduct bridges; and some deep-cutting near Waring's Green. In May 1796 the summit-level of this canal from the *Worcester and Birmingham* canal to Hockley-heath was completed and opened. This company was authorised to raise 225,000l. the amount of shares 100l. The rates of tonnage and exemptions are very long; see *Phillips's* 4to. *History*, Appendix, p. 111 and 112. At the junction with the *Worcester and Birmingham* canal stop-gates are to be erected, to be shut and locked by either company, when the supplies of the other canal fail in dry seasons; with the *Dudley and Worcester and Birmingham* canals there are a number of regulations as to tonnage, in the second act above (35 Geo. III.). About the year 1792 the *Stratford and Croperdy* canal was proposed to join this at Stratford.

Stratford and Croperdy. About the year 1792 a canal was proposed to connect with the *Avon* river and *Stratford* canal at Stratford, and proceed to the *Oxford* canal at Croperdy, by a course of about 31 miles in length; this being the southern part of the proposed line between Dudley and Croperdy; the northern part thereof being since occupied by the *Stratford* and the *Dudley* canals.

STROUDWATER CANAL. Acts 34 Geo. II. 15 Geo. III. 23 (for *Thames and Severn*), and 33 and 37 Geo. III. (for *Gloucester and Berkley*).—The general direction of this canal is about E. for 8 miles, (following nearly the course of *Stroudwater* river,) in the county of Gloucester; it is not greatly elevated; its objects are the import of coals, and forming part of the first direct communication between the

Severn and Thames and Isis rivers; at Wheatenhurst the *Gloucester and Berkley* canal crosses and connects herewith. Stroud is the 114th British town, with a population of 5,422 persons. This canal commences in the *Severn* river at Framiload, and terminates in the *Thames and Severn* canal at Wallbridge near Stroud; from the *Severn* to the *Thames and Severn*, there being a rise of 108 feet: this canal is wide enough for the *Severn* river boats. The engineers were Mr. *Thomas Yeoman* and Mr. *Robert Whitworth*. The first of the above acts was for powers to raise 20,000l. in 200l. shares, intending to execute the works under the powers of an act of 2 Geo. II. for improving the *Stroudwater* river, but several expensive law-suits put a stop to the works, as we have already mentioned, until the second act was obtained: a double lock of 14 feet rise on this canal had a slipping bank of earth 20 feet high by its side, and gave immense trouble, to prevent the walls thereof being bulged in, this was at last accomplished by the turning of two dry drains of four feet diameter, between the lock and the bank. In 1802 the dividends on shares in this concern were 6l. each, and their price was about 25s. This canal has no horse towing-path, but slides are erected thereon; and the barges are hauled by men. Where this canal crosses the *Gloucester and Berkley*, stop-gates are to be erected to prevent this canal from losing its water; no dues are to be taken for vessels crossing either of these canals. If, while the *Gloucester and Berkley* is cutting, the navigation of this canal is interrupted, five guineas per day are to be paid to this company; vessels passing to or from the *Berkley and Gloucester* canal and this, are to pay the same tonnage as to and from the *Severn* at Framiload. This company are authorised to take 2s. 3d. per ton for coals which pass through this canal, and on the *Thames and Severn* canals, but not beyond Brinscomb bridge thereon, and for such coals as pass eastward of Brinscomb bridge, 1s. per ton.

Stroudwater River. The act of 2 Geo. II. passed for making this river navigable between the *Severn* and the town of Stroud, a distance of about 8 miles, as above; but the opposition of the millers and others prevented its being accomplished, until 34 Geo. II. when Mr. *Bridge* undertook to construct the navigation, without waste of water or prejudice to the mills, by means of cranes to hoist the goods in boxes out of the boats in one pound, and place them in others in the adjoining pounds, as we have before described; but this scheme miscarried, and the projectors were nearly ruined: at length the *Stroudwater* canal was constructed by the side of this river as above.

SURREY IRON RAIL-WAY, (Northern part). Acts 41 and 45 Geo. III.—This, the first public rail-way constructed near the metropolis, has about a S.E. direction, for 10 miles, in the county of Surrey: its southern end has a considerable elevation: its objects are the import of coals and manures, and the export of chalk, flint, fire-stone, fullers'-earth, and agricultural products. Croydon is the 108th British town, with a population of 5703 persons; Wandsworth is also a considerable town on this line; which commences near the tide-way in the river *Thames* at Wandsworth, and terminates at the turnpike-house S. of Croydon, in the southern part of the *Surrey iron-rail-way*; at the N.W. extremity of Croydon the line of this rail-way is but about $\frac{3}{4}$ of a mile from the *Croydon* canal; from Mitcham common a branch goes off for about $1\frac{1}{2}$ mile to Mr. *Shipley's* skinning mill at Carshalton; and, to Messrs. *Were and Burfb's* oil-mill, about $\frac{1}{4}$ of a mile, there is another branch at Garat-lane. This rail-way has nowhere a greater ascent than about 1 inch in 10 feet: it is double throughout, with numerous crossing places for the carriage out of one road or track into the

others; of these we have already given a particular account, as also of the contrivances for shooting the contents of the railway waggons, on some occasions, into barges lying in the entrance basin at Wandsworth, which is about $\frac{1}{4}$ of a mile long, with a lock next the *Thames*, and is spacious enough to hold 30 barges or more at once, several of which can lie along the wharf to load or unload at the same time. The width of each track is about $5\frac{1}{2}$ feet, the waggons carry about $3\frac{1}{4}$ tons each, and several of them are often linked together to be drawn by one horse. This rail-way crosses the Wandle river twice on wooden bridges. On the 9th of January, 1802, the entrance basin at Wandsworth was completed and opened; in October of the same year, the rail-way from the side thereof crossing the turnpike road, and extending to Garrat was completed, and in the course of the present year it was opened to Croydon. The company were, by the first act, authorised to raise 50,000*l.* and a further sum, by the act of the late sessions, the amount of shares 100*l.* Few subjects have been more variably stated than the cost per mile of this rail-way. Mr. *John Phillips*, after noticing in his *History* the commencement of this work, adds, that iron rail-ways are made at an expence of about 300*l.* per mile. The original estimate was, we believe, 2000*l.* per mile; at a public meeting at Gosport, in September 1803, it was stated by some favourers of the extension of a canal from Croydon to Portsmouth, that the expenditure on this rail-way had amounted to 6,400*l.* per mile; but the advocates for extending this rail-way to Portsmouth instead of a canal, then contended that the expence did not exceed 4,500*l.* per mile; while Mr. *James Malcolm*, in his *Agricultural Report* on Surrey, just published, after stating the great pains he had been at to come at the facts, says, "instead, therefore, of the expence being 2000*l.* per mile, it appears as if it would be 7000*l.*!" (this includes all the expenditure of the company). The rates of tonnage are from 2*d.* to 6*d.* per ton, per mile, for different goods; and owners of adjoining lands may use the rail-way as a drift road. Ten pounds annually are to be paid to the city of London by this company, for connecting with the river *Thames*.

SURREY IRON RAIL-WAY (*Southern part*). Act 43 Geo. III.—The general direction of this line of rail-way is nearly S. by a bending course of about 16 miles, in the county of Surrey; upon the chalk-hills or North Downs, it is greatly elevated; its objects are the import of coals and manures, and the export of chalk, lime, fire-stone, free-stone, flints, fullers'-earth, and agricultural products. Croydon is the 108th British town, with a population of 5,743 persons; Ryegate and Godstone are also considerable towns on or near this line, which commences in the northern part of the *Surrey iron rail-way* at Croydon turnpike, near the southern end of that town, and terminates at Godstone, passing near to the towns of Merstham and Ryegate in its course. It has a rise or fall of 1 inch in 10 feet, in crossing the Downs: near to Merstham is a considerable length of cutting 30 feet deep in some places, in order to obtain the proper descent; at Smitham-bottom is an embankment of 20 feet high, across a valley, for the same purpose, with a road-arch under it; it crosses the Croydon and Merstham road in another place by an arch, and the road is sunk considerably in order that the rail-way with its proper descent may pass over it. The width of this double rail-way, including a path on each side for the carriage drivers is 24 feet. Some of the waggons hereon have their fore-wheels placed quite forward, and the hind-wheels nearly under the middle of the wagon, by which means stones, &c. can easily be shot out of them when required. Near to this rail-way at Merstham there is a quarry of white soft free-

stone (much similar to the Totternhoe-stone on the *Grand Junction* summit branch). The shares in this concern are 100*l.* each. In September, 1801, it was in contemplation to make a branch of this intended rail-way from near Ryegate to the *Arun* river at Wilborough green; and another branch or rather an extension hereof, from near Godstone to the *Ouse* upper navigation at Linfield. About the month of June last (1805,) this rail-way between Croydon and Merstham was opened, and 12 waggons loaded with stone, weighing $38\frac{1}{2}$ tons, were drawn with ease by one horse for 6 miles down the descent to Croydon-turnpike, in 1 hour and 41 minutes; from which place the same horse set off again with 4 other loaded waggons attached, and persons riding on them, making in the whole more than 55 tons, which it was said he drew with apparent ease!

SWALE RIVER. The general direction of this river is nearly N.W. for about 35 miles, by a crooked course in the North Riding of Yorkshire. Its northern end is very considerably elevated, and this river is subject to rapid and almost uncontrollable floods: its objects are the carriage of coals, and the export of farming products. Aldborough and Richmond are considerable towns near, or on this river, which commences in the *Tore* river at Myton; and the navigation was intended to terminate at Richmond. In 1767, Mr. *John Smeaton* was consulted on the propriety of moving Topcliff mill to a new site, in the design which the proprietors of this navigation had adopted of building new mills in several places, and on which it has been said that 30,000*l.* was expended, and but a small part of the above line was rendered effectually navigable. Mr. *John Smith jun.* was the resident engineer. In 1801, the *Topcliff and Pierbridge* was proposed to join at Topcliff.

SWANSEA CANAL. Act 34 Geo. III.—The direction of this canal is about N.N.E. for $17\frac{1}{2}$ miles in the counties of Glamorgan and Brecknock, in South Wales. Its northern end is considerably elevated: its objects are the export of coals and iron-stone, iron, &c. the carriage of lime to the intermediate works and country; and copper-ore, to the works, &c. Swansea is the 99th British town, with 6,099 inhabitants. This canal commences in Swansea harbour, in Swansea bay, at the mouth of the Tawe river, and terminates at Hen-noyadd lime-works: a part of this line between Llandoor brook and Morris town, $1\frac{1}{2}$ mile in length, (called *Morris's canal*) through the estate of the *duke of Beaufort*, was constructed by that nobleman, who receives the tolls thereof. From near Swansea to Llanfamlet is a branch of 3 miles in length; and a rail-way branch of about 2 miles to a large coal mine, where an audit or tunnel of 3 miles in length has been made under ground, and out of which 200 tons of coals are daily brought; on an inclined-plane on this branch, near 1 mile in length, the coal-waggons descend without horses, regulated by a convoy or brake, as we have before described, and the empty waggons are drawn up the plane again by horses. From the tide-way at Swansea to opposite Pont-ar Taw, $8\frac{1}{2}$ miles, is a rise of 105 feet; thence to Pont Gwaynclawdd, 8 miles, is a rise of 230 feet; and thence $\frac{2}{3}$ of a mile to Hen-noyadd is a rise of 31 feet. An act 44 Geo. III. passed for amending two former ones, for building piers, and deepening and improving the harbour of Swansea, under the direction of captain *Joseph Huddart*. About the year 1797 the western pier, extending 228 yards into the sea, was completed; which had the effect of confining the current of the Tawe river, and deepening the mouth of the harbour 2 feet: in 1802 this pier was extended 57 yards farther out, and in November 1804 a jetty thereto was completed. In April last (1805) a new pier was begun on the eastern side of the harbour,

harbour, which is to be extended out and brought round weltwardly, within 70 yards of the other pier, for effectually securing and scouring the mouth of the harbour: dry and wet docks are also intended, and by embanking the river, a most spacious quay is to be formed. From this port, in 1768, only 694 ships cleared out; in 1790 these were increased to 1677 ships, and in 1800 to no less than 2590 of 134,264 registered tons. Within 2 miles of Swansea, seven large copper-works have of late years been erected, for smelting of roasted ore from the Cornish and Anglesea mines, brought in ships, which return laden with coals for working the mine-engines and roasting the ore: the number of iron-furnaces, potteries, and other large works near this place are also considerable. This canal company was authorised to raise 90,000l., the amount of shares 100l. each; and it was provided in the act, that this canal should be completed in 4 years; several rail-way branches may be made thereto. The engineer was Mr. Thomas Sheafly, and the canal was completed and opened in October 1798. The rates of tonnage may be seen in *Phillips's 4to. History, Appen. pages 166 and 167*. Boats with less than 15 tons, when the water does, and 10 when it does not flow over the lock-weirs, are not to pass without leave or paying for that tonnage. In the year 1804, 54,235 tons of coal and culver were brought down this canal for exportation, and the gross tonnage on this canal amounted to 3590l. In Swansea harbour, the *Swansea and Oystermouth* rail-way connects with this canal.

SWANSEA AND OYSTERMOUTH RAIL-WAY. Act 44 Geo. III.—The general direction of this rail-way is nearly S.W. by a bending course, following closely the sea shore, for about $7\frac{1}{2}$ miles in length in the county of Glamorgan; in South Wales: its object is the carrying of lime-stone, lime, and coals. Swansea is the 99th British town, with 6,099 inhabitants. This rail-way connects with the *Swansea* canal in Swansea harbour, and proceeds thence to the Mumbles lime-stone quarries near Oystermouth. In April last (1805) this rail-way was nearly completed. There is a light-house on the Mumbles point for the security of ships entering Swansea harbour, which was lately improved.

TAMAR MANURE NAVIGATION. Act 36 Geo. III.—The general direction of this canal is nearly N.W. for about 22 miles, following the course of the Tamar river, on the southern coast of the counties of Devon and Cornwall. Its northern end is considerably elevated: its objects are the import of coals, and sea-sand and lime as manures; and the export of agricultural products. Launceston is the only considerable town on this line; which commences in the tide-way in the *Tamar* river at Morwellham quay (the commencement of the *Tavistock* canal) near Calstock, and terminates at Tamarton bridge in North Tamarton, with a branch to Rich-mill grove in Launceston. The *Tamar* is to be made navigable as far as Port-pool near Blanch-Down, before the canal commences. The locks are to be either about 5 feet or $9\frac{3}{4}$ feet wide, and $12\frac{1}{2}$, $24\frac{1}{2}$, or $36\frac{1}{2}$ feet long, in order to receive a number of small boats, in length and side by side therein, as may be judged best. Inclined planes and rail-ways may be substituted in place of locks on the canal in any part. This company is authorised to raise 121,000l., the amount of each share 50l. A feeder may be taken from the *Tamar* river, and all springs within 2000 yards of the head level, and within 1000 yards of every other part of the line; 200l. per annum is to be paid by this company to the duchy of Cornwall, for the liberty of making this navigation. We have not been able to learn what progress has yet been made in the cutting of this canal. By the act 14 Geo. III. a

canal was intended, but never executed, through this line, and extending to the Irish Channel, called the *Bude and Launceston* canal.

TAMAR RIVER. The general direction of this river is nearly north by a crooked course of about 6 miles, between the counties of Devon and Cornwall; the tide flows through its whole length; Beer-Ashton is a considerable town near this navigation; which is used for the import of coals, sea-sand, lime, &c. and the export of slate and agricultural products. It commences in *Hamoaze* and terminates in the *Tamar Manure* navigation and *Tavistock* canal, at Morwellham quay near Calstock. In the year 1774, an act passed for the *Bude and Launceston* canal intended to connect with this at Calstock, but it was never carried into execution.

TARBETH CANAL. In 1773, Mr. Watt surveyed the isthmus between East and West *Tarbeth* lochs, on the west coast of Scotland, for a canal to communicate between Loch *Fine* and the sound of *Jura*; the distance of high-water mark in the two lochs he found to be 1 mile, and the height of the ridge between them, 45 feet above high-water at neap tides. Mr. Watt's different estimates were, for a canal with locks 7 feet deep, 17,988l.; and for one 10 feet deep and a proportional width, 23,884l. The expences of a thorough cut without locks, of 12 feet deep at high-water, 73,849l., and for one of 15 feet deep, 120,789l. A very large canal has since been formed about 13 miles north of this, called the *Crinan* canal, which more effectually answers the purpose of communication between Loch *Fine* and the sound of *Jura*.

TAVISTOCK CANAL. Act 43 Geo. III.—The general direction of this canal is N.E. for about $4\frac{1}{2}$ miles in the county of Devon; great part of it is considerably elevated above the level of the sea: its objects are the export of slate, copper-ore, and other minerals, and of agricultural products; the import of coals, lime, and other articles for the supply of *Tavistock* town and the surrounding country; and to facilitate the working of the mines in Morwellham down: this canal commences in the tide-way in *Tamar* river (near the commencement of the *Tamar Manure* navigation) at Morwellham quay new basin, near Calstock, and terminates at the town of *Tavistock*. From Crebar near the north end of the tunnel, it has a branch of 2 miles to the slate quarries at Mill-hill bridge. From the *Tamar* river, $\frac{1}{2}$ of a mile is level with high-water at Morwellham quay; thence in $\frac{1}{4}$ of a mile, is a rise of 237 feet; thence, about $3\frac{1}{2}$ miles to *Tavistock* is level; the branch is level to New Quarry, about $1\frac{2}{3}$ miles; thence to Mill-hill bridge, $\frac{2}{3}$ of a mile, is a rise of $19\frac{1}{2}$ feet. The locks upon this canal are to be calculated in length and width for the use of boats of $12\frac{1}{2}$ feet long, and 5 feet wide, either singly or several together, as on the *Tamar Manure* navigation above mentioned: but the company have the power to erect inclined planes for boats, or boxes of goods, instead of locks, if they think fit. Through Morwellham down, which is of hard rock, and supposed to be intersected by several fissures, or loads filled with metallic ores, is to be a tunnel about 2500 yards long, and about 460 feet beneath the highest point of the down in its course: near Crebar is to be an embankment and aqueduct bridge 60 feet high, across the Lumbourn river; which is to have a new course cut for it for a considerable distance near the branch of this canal below New Quarry. This canal is to be fed from the *Tavy* river at *Tavistock*, and by any springs or streams within 5000 yards of the line. Mr. *John Taylor* is the engineer to this canal and tunnel, which passes entirely through the estate of the *duke of Bedford*, who has leased to this company the mines which may be found in the tunnelling, or within certain distances of this canal. In February last (1805)

(1805) about 300 yards in length of the tunnel had been cut, and a known load of copper-ore had been intersted therein, which gave the best hopes of discovering other unknown ones, as the work proceeds. This company is authorized to raise 50,000*l.*, and the amount of each share is 50*l.* The rates of tonnage are for lime-stone conveyed through the tunnel, 1*s.* 3*d.* per ton; for building-stone, slates, bricks, tiles, clay, sand, earth, dung, ores, iron, and metals (made marketable) conveyed through the tunnel, 2*s.* per ton; and for coals, coke, culm, lime, timber, bark, corn, grain, and all other goods passing through the tunnel, 3*s.* per ton; building-stone, slate, &c. as above, carried on the whole, or any part of this canal, or its branches, except in the tunnel, 1*s.* per ton; and coals, coke, &c. 1*s.* 6*d.* per ton. The last rates are not to be charged on any goods either carried or subsequently removed on any part of this canal, which have before paid the tunnel rates: and ores may be carried to the dressing-floors, or the waste or rubbish of mines or loads be removed to proper places on any part of this canal or its branches, free of tolls. Besides the above rates, all goods which pass into, or from the *Tamar* river, and are not loaded at Morwellham quay, are to pay as follows for reimbursing the owner and occupiers thereof, for the loss of wharfage on such goods, viz. slate 3*d.* per ton, lime-stone 6*d.* per ton; ores, (made marketable) iron, bricks, tiles, clay, sand, earth, and dung, 6*d.*; and all other goods 1*s.* per ton; and over and above this, one penny per ton is to be paid on all goods entering the canal basin at Morwellham. The duke of Bedford may make collateral branches or rail-ways to this canal in any part.

TAVY RIVER. The general direction of this river is N.E. for about 2 $\frac{3}{4}$ miles in the county of Devon; the tide from the south coast flows through its whole length: its objects are the import of coals, sea-sand, &c. and the export of slate, copper-ore, &c. It commences in *Hamoaze* and terminates at Lophill quay.

TAW RIVER. The direction of this river, or estuary, is nearly east for about 8 miles on the north-west coast of Devonshire: the tide flows through its whole length: its objects are the supply of Barnstaple and the adjacent country with coals and other articles, and the export of farming products. This navigation commences in St. George's Channel, at Biddeford bay, and terminates at the town of Barnstaple: near to Appledore the *Torridge* river joins this navigation.

TAY RIVER. The general direction of this river, firth, or estuary, is nearly west for about 26 miles, between Angus and Fife, and in the county of Perth in Scotland. The tide flows through its whole length: its objects are the supply and trade of Dundee and Perth, and the adjacent country. Dundee is the 18th British town, with 26,084 persons, and Perth the 26th, with 14,878 persons. This firth commences in the German Ocean, and terminates at Perth bridge. This bridge, built of stone by Mr. *John Mylne*, was swept away by a rapid flood in 1621. In 1763, Mr. *John Smeaton* was consulted on the building of a new bridge; and in 1766 he began one of 7 arches, where the river was 893 feet wide: the depth of the Tay at this bridge at neap tides in dry seasons was only 2 feet, at spring tides 10 feet deep. At Stanley, 7 or 8 miles higher up this river, three foughs or tunnels of considerable length (one of them from 12 to 9 feet wide arched with stone) are driven through the hill, which occasions a great loop in the river, by which 24 to 20 feet fall is gained, for a large portion of the stream, to work cotton-mills and other machinery; and running in this subterraneous channel it never freezes.

TEES RIVER. The general direction of this river is nearly S. E. by a crooked course of about 12 miles, between the counties of York and Durham: the first four miles are by a very wide estuary: the tide flows through its whole length: its objects are the trade of Stockton, and the export of agricultural products. Stockton is a considerable town on this river; which commences in the German ocean, at Seaton Nook, and extends to the town of Stockton. In the present autumn there was an intention of improving this navigation. In 1803, the foundations were laid for an iron-bridge, to be erected under the direction of Mr. *Thomas Wilson*, over this river at Yarm, a few miles above Stockton, in place of an old stone-bridge, whose clumsy piers had long obstructed the current, and occasioned the river frequently to overflow its banks. In 1768, the *Winston and Stockton* canal was proposed for extending this navigation westward to the coal district about Winston.

TEIGN RIVER. The direction of this river, or estuary, is west for about 4 $\frac{1}{2}$ miles in the south-eastern coast of Devonshire: the tide flows through its whole length: its objects are the import of Newcastle or Welsh coals, and the export of potters' clay, bovey coal, and agricultural products: it commences in the English channel, and terminates at Newton-Abbots, at the commencement of the *Stover* canal, near to Newton-Bushel.

Ternbridge and Winsford. In 1765, Mr. *Whitworth* proposed a canal from the *Severn* river at Ternbridge below Shrewsbury, to the *Weaver* navigation at Winsford, 63 $\frac{1}{2}$ miles, in the counties of Salop, Stafford, and Chester, with a branch therefrom, near Bridgeford; 43 miles, to the *Trent* river at Wilden-Ferry. From the *Severn* to the summit or grand-ridge (requiring 25 feet deep cutting,) below Offley-Park, 24 miles, is a rise of 136 $\frac{3}{4}$ feet; thence to the Trent branch, (1 $\frac{1}{4}$ mile below Bridgeford,) 7 $\frac{1}{4}$ miles, is a fall of 54 $\frac{3}{4}$ feet; thence to the summit or grand-ridge again, (requiring 25 feet deep-cutting,) in Madeley park, 10 $\frac{1}{2}$ miles, is a rise of 800 $\frac{1}{4}$ feet; thence to the *Weaver* navigation, 22 $\frac{1}{4}$ miles, is a fall of 284 feet: the branch from Bridgeford to the Trent has a fall of 209 $\frac{1}{2}$ feet. The course of this canal is by Wansford, Allscot, Crudgington, Chetwin-park, Batchacre-Grange, Eccleshall, Standon, Wyburnbury, and Barton-cross, near Nantwich. The branch is conducted by Stafford, Tixall, and thence following within a small distance the course of the Trent river. This canal was proposed to be 27 feet wide at top, 18 at bottom, and 5 feet deep, with a towing path on both sides; the locks 60 feet long and 13 wide, and about 10 feet rise each: the boats of 50 tons burthen: 78 road bridges, and 25 accommodation bridges were thought necessary, and 162 aqueducts and culverts: the estimated expence was 99,800*l.* The *Staffordshire and Worcester* and the *Trent and Mersey* canals, which were adopted in the following year, embrace all the general objects of this canal. The *Sandbach*, and the *Newport and Stone*, have since been proposed to occupy parts of the south-western end of this line, but, like this, were overruled.

THAMES RIVER, (lower part). Acts 19, 29, 39, 42, 43, 44, and 45 of Geo. III.—This fine river, by far the most important for trade, not only in Britain but in the whole world, has its career nearly west for about 72 miles between the counties of Kent and Essex, and Surry and Middlesex. The first 20 miles is by an exceeding wide estuary; the next 21 miles is still an estuary of considerable width; the remaining 31 miles is crooked, and gradually diminishing: the tide flows very powerfully through its whole length. To enumerate its objects would be to recount almost every species of trade and commerce which is carried on in

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Europe. At East Mersey it connects with the *Colne* river; at West Mersey, with *Blackwater* river; at Foulness east point, with *Crouch* river; at Whitstable and at Sheerness, with the *Medway* river; at Gravesend, with the *Thames* and *Medway* canal; opposite to Purfleet, with the *Darent* river, or Dartford creek; at Bow-Creek, with the *Lea* river; at Blackwall and at Limehouse-hole, with the *Isle of Dogs* canal, (a new side-cut for shortening the navigation of this river); at Greenland-dock, and at Wilkinson's gun wharf, Rotherhithe, with the *Grand Surry* canal; and, at Limehouse, with the *Limehouse* canal. London, the first British town, has a population of 864,845 persons; Greenwich is the 31st, with 14,339 persons; and Woolwich is the 53d, with 9,826 persons; Margate, Faversham, Milton, Queenborough, Sheerness, Leigh, Gravesend, Grays-Thurrock, and Deptford, are also considerable towns on or near this lower part of the *Thames* river; which commences in the English channel at East Nefs near Margate, and terminates in the *Thames*, middle part, at London-bridge. Large ships of war can come up to Deptford, and merchants' ships of 7 to 800 tons burthen frequently lie at the keys close to London-bridge. The port of London, or part wherein the ships lie, generally called the pool, extends almost 4 miles, nearly to Deptford, in which space more than 1000 vessels have been seen moored at one time! the rapidly increasing trade of this grand emporium of commerce, the regulations which have of late been made, for mooring the ships at more convenient distances, for a passage up and down the river, and the contiguity of the *West India* and *East India* docks to Blackwall are expected ere long, to extend the tiers of ships as far as that place. It was stated, in the year 1800, that the trade of the port of London had increased in the last, or 18th century, by 6547 vessels and 1,327,763 tons annually; and that (including repeated voyages,) 13,144 ships and vessels were then employed in this trade, to foreign countries, the colonies, and coastwise, besides 2288 lighters, barges, and punts, employed in the middle part of the *Thames*, and on the *Lea* river, and 3336 of the like kinds of vessels used below bridge, in the lading and discharging of vessels, together with 83 boats, sloops, cutters, and hoys, 3000 watermen's wherries, 155 bum-boats, and 194 peter-boats, the total number, (exclusive of ships of war, transports, and navy and victualling and ordnance hoys,) being 22,500 vessels of various sizes and dimensions, either trading to, or stationed within the pool or port of London; the total value of the goods imported and exported annually by them exceeding 67,000,000l.! The corporation of the city of London, as conservators of the river *Thames*, and under the special authority of the above acts, are, at this time, carrying on considerable works for the improvement of this river: several mooring chains in the pool have been purchased of lord Guydir and others, and a harbour-master, approved by the Trinity-house, is appointed to regulate the mooring and conduct of vessels, agreeable to the 19, 29, and 39 of Geo. III.: one of the largest canals ever attempted has been cut, near $1\frac{1}{4}$ mile in length, 142 feet wide at top, and 24 feet deep! across the *Isle of Dogs*, for shortening the passage of vessels to and from the pool, and to avoid the long circuit by Greenwich and Deptford; Mr. *William Jessop* is the engineer, under whom the locks and other works of this canal were successfully conducted and nearly finished, when an unforeseen accident, by the blowing up of the coffer and preventer dams, just as the entrance locks were completed, on the 24th of July last, (1805) prevented this canal from being opened until the 9th of December, when the *Duchess of York*, West Indiaman, of 500 tons burthen, passed through the same, in presence of the lord mayor and corporation of

London. Several large sums of public money have been granted by the above acts out of the consolidated fund; for the repayment of which vessels passing through this canal of 200 tons or upwards are to pay 2d. per ton; those from 200 to 100 tons, $1\frac{1}{2}$ d. per ton: from 100 to 50 tons, 1d. per ton; 50 to 20 tons, 5s. each, and boats and craft 1s. each. Two or more piers are intended to be built at the entrance, for facilitating the entrance of vessels to this canal. Between this canal and the entrance of the *East India* docks, there is a large mass of silicious pudding-stone, consisting of chert pebbles imbedded in a very hard cement, which lies in the bed of the river, and has proved fatal to several ships, on which account the committee, in September 1802, and on several other occasions, advertised for persons who would undertake to lower this rock 18 feet, its length being about 40, and breadth 30 feet; the newspaper accounts of the Boddington West Indiaman having struck on this rock on the 12th of September last appear to be incorrect, the rock being now surrounded by piles and booms, so that no ship can approach it. In the year 1773, Mr. *James Sharp* suggested the propriety of floating, or wet-docks, for the loading and unloading of ships in the *Isle of Dogs*; after much discussion a plan was adopted for this purpose, in the year 1799, called the *West India Docks*, and Mr. *William Jessop* and Mr. *Ralph Walker* were employed as engineers. On the 12th of July 1800, the first stone of this great undertaking was laid with much ceremony. On the 22d July 1802, an unfortunate accident occurred by the bursting of the coffer-dam at the entrance at Blackwall, but which did not prevent the great or import dock, from being opened for the use of West-India ships on the 3d of September 1802. This fine dock, the largest in Britain, is 2600 feet long, 510 feet wide, covering more than 30 acres of ground; its depth being 29 feet, and it is walled in the most substantial manner with bricks, and coped with immense blocks of stone. Three stacks of the superb warehouses on the banks of this dock were completed at this time: on the 22d of August 1803, several other warehouses on the N. side of the dock were finished, and declared ready for public use; and, on 5th July last, two warehouses on the south side, and the whole of that quay were completed. The outward-bound dock, 2600 feet long, 400 feet wide, and 29 feet deep, has been rapidly proceeding since the completion of the great dock, and is now almost ready, we believe, for opening. At Blackwall, and at Limehouse-hole, there are spacious entrance basons, connecting by tide-locks with the *Thames* river; from these entrance basons there are locks into the outward and inward, or export and import docks: these docks are calculated for the accommodation of 300 ships, 12 of which can conveniently enter or go out in one tide: there are to be six immense ranges of warehouses in the whole, with cellars, cranes, and every possible convenience: the whole is to be surrounded with a wall 30 feet high, and a wet foss 12 feet broad, and 6 deep: for security from fire, no dwelling-houses or work-shops are to be built within or near to the boundary wall; no gunpowder is to be suffered to enter the walls, or any fire, candles, or lamps to be lighted within the same, except the necessary street-lamps on the quays. The company were at first authorized to raise 600,000l. the amount of shares being 500l. each, which, in 1802, bore a premium of 28l. per cent.: the profits to the subscribers are limited to 10 per cent.: several loans of the public money from the consolidated fund have been made towards completing this design. Mooring-chains are provided in the river opposite the entrance basons, for the use of ships entering these docks, in which all West India goods whatever (except tobacco in some cases,) are to

be landed, and all outward-bound ships for the West-Indies are to load herein, or in the *Thames* at Blackwall; but the tonnage for the building and maintenance of these docks is, (by 39 Geo. III.) not levied exclusively on the West India trade, as every vessel both on its inward and outward voyage (except coasting vessels under 45 tons, king's ships, corn, fishing, and passenger vessels, and craft navigating above Gravesend,) is to pay: coasting vessels at the rate of 1d. per register ton; and ships trading to parts beyond the seas are to pay higher rates, amounting, in some cases, to 3½d per ton; see the particulars, as also the rates for wharfage, warehouse-room, cooperage, &c. in the *Agricultural Magazine*, vol. i. p. 115. Mr. Robert Edington, in his *Essay on the Coal Trade*, 1803, after estimating 4284 coal-ships to enter the port of London annually from the neighbourhood of Newcastle-upon-Tyne, with 1071 chaldrons each, on the average, (a quantity considerably short of the actual importation, see *Monthly Magazine*, vol. xvii. p. 99, and vol. xix. p. 99.) objects strongly to the above rate, which annually taxes the coals consumed in London and its vicinity with 4284l., on account of these docks, which they are not allowed to enter. For the general accommodation of ships unloading and loading in the port of London, another set of docks was, after much discussion, undertaken, in the year following, called the *London Docks*, (or sometimes the *Wapping Docks*.) Acts 40, 44, and 45 of Geo. III. Mr. John Rennie and Mr. Alexander were the engineers employed; on the 26th of June 1802, the first stone of these works was laid, by Mr. Addington, the then minister; and the same proceeded without any disaster or impediment, until the great dock, the entrance basin, and several of the warehouses were completed, and opened for use on the 1st of February last (1805). The great dock is about 1260 feet long, and 830 feet wide, and covers about 24 acres of surface: it is 29 feet deep from the top of the walls; but the depth of water is only 23 feet; the walls are of brick, coped with stone, and every part of the work is executed in the most complete and masterly style. On the northern side of the dock there is an open shed the whole length, for examining and weighing and the landing of goods, under cover from the weather, from whence a number of small trucks moving on rail-ways convey them to five immense stacks of warehouses behind them, or the cranes hoist them into carts, as may be wanted. Near the S. E. corner of this dock are two immense warehouses let to government for the stowage of tobacco; one of them is 762 feet long, and 160 wide, the other 250 feet long, and 200 feet wide, each being in one single room, without any partitions, and their roofs are said to exceed 6 acres of slating; they are but one story high, but have spacious arched vaults under them of the same extent, for the stowage of wine, oil, spirits, &c. Other large ranges of warehouses are to be built, and their fronts have been begun north of the present range of warehouses; the windows and doors of these last being bricked up, serve as a temporary wall to enclose the premises: warehouses are also intended on the west and south side, where the high temporary fence-wall at present stands. The only entrance at present to this dock, from the *Thames*, is near to Bell-dock in Wapping, where two massive piers of stone project into the river, and have a tide-lock between them, and further north is a curious iron double swing-bridge, in the line of Wapping-street, which we have already described; within this is the entrance basin, of an irregular figure, of about 3 acres extent: this basin is connected with the river at every high-water, by the opening of the gates, which shut again and retain the water at that height; from this basin ships lock up into the great dock, whose surface is kept about

3 feet above the height of ordinary tides, by a powerful steam-engine erected on the east side of the entrance basin for that purpose, and the bottom of the dock is about 15 inches above low-water mark in the river. There is designed to be another entrance from the *Thames* by means of Hermitage-dock, into the great dock at its S.W. corner; and from near the opposite or N.E. corner, provision has been made, and the connecting canal formed, which is to join it with another large dock, intended to be dug, and connect with the *Thames* at Shadwell. Notices were given in September last of an application to parliament for further powers, to proceed with the above works. The present dock is capable of accommodating 200 merchant ships, and the entrance basin will hold a vast number of small craft, without impeding the passage of ships to or from the great dock. The whole of the docks or warehouses are, when completed, to be surrounded by a very high wall to prevent depredations or the communication of fire, against the happening of which the same regulations are adopted as at the West-India dock above mentioned. Six large mooring chains are fixed at proper distances from each other in the great dock for ships to moor to, consisting of very large floating blocks of deal timber. This company were authorised by their first act to raise 1,500,000l., the amount of each share being 500l. They were required to purchase the concern of the Shadwell water-works for 50,000l.; and ample provisions are made for compensating the owners of the river-quays, the proprietors of street-cart licences, &c.: and full accounts of the receipts and expenditure of this company, and of the West-India dock company, are to be presented annually to parliament. The tolls or rates payable to this company, by ships which enter their docks, are for British coasting vessels (including colliers) 1s. per ton; five other classes of ships are enumerated, which are to pay from 15d. to 30d. per ton; see *Agricultural Magazine*, vol. iii. p. 162. For the landing, loading, and housing, and for shipping of goods of every different kind, the same sums respectively are to be taken by this company, as were usually paid at the different quays of the port of London in the year 1798. The whole of the site of these docks was covered either with streets and houses, or with gardens, and which the company had to purchase for immense sums of money. For the particular accommodation of the large ships belonging to the East-India company, a third spacious set of docks has been designed, and in the 43 of Geo. III. an act passed for enabling the company to raise 200,000l. for the purpose of building the *East-India Docks*; and to purchase the dock belonging to Mr. Perry's maff-house at Blackwall, for their entrance basin. Mr. Ralph Walker is the engineer; and on the 4th of March last (1805) the first stone of this great undertaking was laid by captain Joseph Huddart, and the works are now proceeding with the utmost expedition: the largest, or import dock, is to cover 18 acres of ground, the export dock is to be 9 acres in content, and the entrance basin about 3 acres: the depth of these docks is to be greater than either the *London* or the *West-India* docks; the entrance locks now building are 48 feet wide in the clear, and each gate is to be 27 feet wide. Near to Deptford, *Greenland-Dock* has its entrance, by a tide-lock, into the river *Thames*; this dock is about 900 feet long and 400 feet wide, and was constructed several years ago, for the accommodation of ships employed in the Greenland, or whale fishery, with suitable conveniences at proper distances for melting and refining their oil. It is intended that the *Grand Surry* canal shall have a cut into, and a passage for its barges, through this dock: and the same company are now excavating a dock near the termination of their canal, at Wilkinson's gun-wharf, Rotherhithe,

which seems to be intended to admit small ships from the *Thames*. At Deptford, Woolwich, and at Sheerness there are spacious dock-yards and naval arsenals on the banks of this river, and others at Chatham, within a few miles of it, on the *Medway* river. In the year 1800 it was proposed to make a large dock and yard, for repairing second and third rate ships of war, of which *Major General Banton* has the direction, near the salt pans on the *Isle of Grain*, on the *Medway* side of it: its principal object is for repairing the ships stationed in the Downs and North Seas. In the year 1804 it was proposed to form a wet-dock, of about 12 acres extent, connecting with the *Thames* river, by *Northfleet* creek near Gravesend: the site of the old chalk-pits is intended to be excavated for this dock, in which the new ships of war built at Deptford, Woolwich, and Chatham are to be received to be rigged and fitted for sea, instead of sending them to Sheerness; that the arsenal there may be wholly appropriated to the victualling and ordnance department. A pier is now building for the protection of *Sheerness* harbour, under the authorities of the acts of 41 and 43 of Geo. III. At Margate, there was an ancient wooden pier in this river, for the protection of the hoys and vessels trading to that place, but in 27 Geo. III. an act passed for an excellent stone pier, which has since been there erected. The great distance which the inhabitants of Gravesend, and Grays-Thurrock, and all those parts, have to travel (over London bridge) to communicate with each other by land, gave rise, in May 1798, to the proposition by Mr. *Ralph Dodd* for a tunnel, or road-arch, under the *Thames*, from near Gravesend to Tilbury Fort (see *Nicholson's Journal*, 4to. vol. ii. p. 473.); and an act of 49 Geo. III. passed to authorise the raising of 50,000l., in 100l. shares, for the *Thames Tunnel*, and to levy 2s. 6d. on each coach, 4s. on each waggon, 2s. on each cart, 1s. on each horse, 2d. on each foot-passenger, and some other tolls, for passing through this tunnel. Government to pay 100l. annually, in lieu of all tolls, for the passage of troops and of government stores of every kind: 80l. to be paid annually to his majesty, and 20l. to the corporation of Gravesend and Milton, in lieu of the right of ferries, near the intended tunnel, to which they are entitled. Mr. *Dodd* proposed his arch to be a cylinder of 16 feet diameter in the clear, and estimated that the same might be executed for 16,000l., the length of the tunnel being 900 yards; but it does not appear that at this time, or for more than two years after, any borings had been made, even on the shore of the river where the tunnel was intended, to prove whether the chalk rock, which Mr. *D.* had calculated upon tunnelling in, existed or not: at length, about September 1800, a bed of chalk, supposed to be the same which appears on the surface at Gravesend, was discovered, by Mr. *D.*'s borings, at 72 feet beneath the surface, at Tilbury Fort; a steam-engine was thereupon erected, and a perpendicular shaft of 146 feet deep was sunk at Gravesend, all in chalk; when, by one of those unaccountable accidents to which abortive schemes seem peculiarly liable, this engine-house took fire, and was burnt down, and shortly after the scheme was given up altogether. In the last session of parliament (45 Geo. III.) an act passed for making other archways under the *Thames*, for the passage of carriages and foot passengers, between Rotherhithe and Limehouse; and we have since read that Mr. *Robert Vazie* is the engineer to these *Rotherhithe archways*, that the foot-way arch is to be made a little to the west of the *London-Dock* entrance, and the carriage-way arch at the ancient horse-ferry between Limehouse and Rotherhithe. On inquiry, we have been told, that the present scheme is, to sink a shaft on one shore of the *Thames*, with an engine thereon and pumps, and to continue the same to a sufficient depth, at

which to begin the tunnel in opposite directions, rising to the opposite shore of the river one way, and to a point sufficiently inland the other way, for a regular and proper ascent for carriages. We can hardly suppose that this matter has proceeded thus far, without its being ascertained, by a series of borings, quite across the river, at short distances from each other, that there is no fissure or crack in the clay, beneath the alluvial matters, which may be filled up with quicksand or other loose soil impracticable to tunnel through, under the bed of a river: but, if we admit the whole matter to be solid clay under the water-way or bed of the river, yet the number of houses which must be pulled down, or endangered, opposite to the tunnel, in this way of conducting the business, in order to bring the archway to the surface on one side of the river, and the inconvenient distance which that entrance will be from the water-side, are almost insuperable objections to its adoption. We have no doubt of the practicability of forming as many arch-ways under the *Thames* as may be wanted (if money is not spared, and scientific and proper men are employed on the work), but are of opinion that for such to succeed, the river must be piled off, for short lengths at a time, while the necessary excavation is made in the bottom for turning a length of the arch, and securely covering it with clay or puddle: and after several successive lengths are thus formed, the water and traffic of the river may be admitted over the part which is completed. Very powerful pumping-engines will be necessary, in this or any other way of conducting such a work with the probability of success. The *Thames* river, below London, is embanked through a great part of its course; the time when these banks were first erected is uncertain, but they appear to be of great antiquity; and during several hours of each tide, the adjoining meadows are 10 feet or more below the level of the water. At Dagenham, about 7 miles below Blackwall, a large breach in one of these banks happened, which captain *John Perry* succeeded in stopping, after several others had failed in their attempts. On the 5th of August 1776 the plan was first adopted of employing convicts in ballasting, and other works for the improvement of the river *Thames*, under Mr. *Duncan Campbell*; these men, properly ironed, are lodged in hulks, or old vessels, off Woolwich, and have principally been employed in enlarging the wharfs at Woolwich Warren, or Royal Arsenal, which work is still proceeding. In the year 1785, and again in 1802, the *London Lynn and Norwich* (or North London) canal was proposed to join the *Thames* river at Limehouse. In 1798 a new channel was proposed to be cut for the *Thames* river straight across the Isle of Dogs, and dams with sluices and locks to be made on the old course of the river, for converting the same, round the island by Deptford and Greenwich, into one vast floating dock for ships! About the same time, the *London Docks* were in contemplation, and a canal was proposed to extend from them to the *Thames* river at Blackwall; the *Isle of Dogs* canal has since been made, and in part answered both these purposes. In 1802 the *Canterbury and St. Nicholas-Bay* canal was proposed to join the *Thames* at the latter place; and in the same year the *London and Wulham-Abbey* canal was intended to join at Bell-wharf in Shadwell. The *Thames* and *Medway* proprietors pay 1s. annually as an acknowledgment to the city of London, as conservators of the *Thames* river, for the liberty of connecting therewith.

THAMES RIVER (middle part). Acts 14 and 17 Geo. III. —The general direction of this part of the *Thames* river is nearly west, by a very crooked course of 37 miles between the counties of Surrey and Middlesex; the tide flows through the first 16½ miles thereof to Richmond bridge: its objects are the supply of London, and the immense trade which is carried

on with the rivers and canals westward: at Vauxhall creek it is joined by the *Grand Surry* canal; at Wandsworth entrance-bafon, the *Surry Iron Rail-way* joins; at Brentford Creek the *Grand Junction* canal joins, and at Ham Haw, near Shepperton, the *Wey* river joins (2 miles from the junction with the *Basingstoke* canal). London, the first British town, has 864,845 perfons; Wandsworth, Brentford, Kingston, Chertsey, and Staines are also considerable towns on this part of the *Thames* navigation; which commences in the *Thames* lower part at London bridge, and terminates in the *Thames and Isis* navigation at London-stone, at the extremity of Middlesex county, about $\frac{1}{2}$ a mile above Staines bridge; from near Chelsea, Pimlico creek extends for about $\frac{3}{4}$ of a mile to Chelsea water-works engine. From low-water at Richmond bridge to London-stone, $20\frac{1}{2}$ miles, is a rise of 36 feet; see a section thereof in *Gentleman's Mag. March, 1771*, and in *Zachary Alnutt's Considerations on the Thames River, 1805*, wherein it appears, that the navigation hereon is in two or three places interrupted by shallows, not exceeding 2 feet 9 inches depth of water in ordinary times. At Laleham, Mr. *John Rennie* gauged the stream of this river, in the dry season of 1794, and found 1155 cubic feet of water per second to be then passing down. The corporation of the city of London, as conservators of the river *Thames*, and by the 17 of Geo. III. above, were unauthorised to make any new side-cut by this part of the river, or to erect any weir quite across the channel of the river; and their exertions for the improvement of this navigation, so much in need of amendment, have been confined to the erecting of jetties and weir-hedges, for contracting the breadth of the stream in many of the shallow places, to the dredging or ballasting of others, to deepen the channel, and to the establishing of regular flushes of water, twice a week, or oftener, from the pounds and mill-dams in the upper part of the river, for enabling barges, during the run of such flushes, to pass the shallow places; except, that they have completed a good horse towing-path through the whole length of this navigation, beginning at Putney bridge, on the south shore of the river: immense sums of money (upwards of 1400. per annum) having been expended on the above inefficient measures, and yet the navigation in all dry seasons continues intolerably bad, and also frequently interrupted and rendered dangerous by floods. We are happy to observe, that notices were given in September last (1805) for an act to authorise the making of weirs across the river, and side-cuts and locks, in the parishes of Laleham, Littleton, Shepperton, Sunbury, Chertsey, and Thorpe. The above act (17 Geo. III.) authorised the city of London to purchase certain local tolls on the navigation between Staines and Richmond, and to levy 4d. per ton per voyage up and down, for the above purposes; they have a commodious barge stationed on the river for the residence of a collector of this toll, and an annual account of all the receipts and disbursements under this act is presented to parliament. The *Grand Surry* canal was (by its act 41 Geo. III.) required to pay 2 guineas, as a fine, and a rent of 60l. annually, for the liberty of connecting with this navigation; and the *Croydon* canal 40l. per annum; the *Surry Iron Rail-way* is to pay 10l. per annum; and the *Grand Junction* company are to pay 600l. per annum, and a toll of $\frac{1}{2}$ d. per ton on all goods which pass into or out of this canal. Among the bridges upon this navigation, *London Bridge*, at its commencement, built of stone in 1209, comes first to be noticed: the river at this place is about 900 feet wide, the bridge, which is 60 feet high and 74 feet wide, consists of 19 arches, the middle one of which is 72 feet wide, but the next there-to on each side are narrow ones, and no regular order is to be observed in the arrangement of the arches, which are

most of them of different widths, under 20 feet; the piers between them are immensely thick, being also furrounded with starlings or vast frames of piling and cross beams of timber, intended for the protection of the foundations of the bridge: previous to the making of the large lock or centre arch, in 1756 (by the removing of a pier and its starling, and turning one large arch instead of two) the clear water-way between all the starlings amounted but to 194 feet, and above the starlings (which are covered when the tide has risen about two thirds of its usual height) the water-way amounted to only 450 feet, or half the width of the river: a further obstruction also arises from the water-wheels, which are fixed on the upper side of the bridge at both of its ends, opposite to several of the arches, for pumping up water for the supply of the city of London and Borough of Southwark. By these contractions of the water-way, a fall and current is occasioned under this bridge, which for several hours of each tide is quite tremendous, and proves a most serious obstacle to navigation, as well of danger to the bridge itself. If Mr. *John Smeaton's* advice had not been quickly followed, in 1756, in returning and throwing in the stones, which had been recently taken up from the old middle pier, together with many cargoes of other large and rough stones, the adjoining starlings and piers of the great lock would certainly have been undermined, and the bridge have fallen: great quantities of chalk and Kentish rag-stones are now annually brought and deposited within the piling of the starlings, and between them, at the time they are repaired; a work for ever requiring to be done, in some part or other, of these clumsy obstructions to the waters and to navigation: immensely deep gulphs are formed at each side of the bridge by the pitch or fall of the water, and the soil and rubbish excavated therefrom is continually thrown up at a distance, so as to form large banks dry at low-water, in spite of a continual dredging or ballast-heaving, which is resorted to for removing them. These inconveniences, which had been long and loudly complained of, occasioned, about the year 1799, a proposal, for pulling down this bridge, and substituting two stone bridges, with capacious arches: these were to be placed near to each other and to connect at their ends; the centre arch of each was to have a draw-bridge, for admitting ships up the river, as far as Blackfriars bridge; the intention of the two bridges being, that one of the drawbridges might always be shut down for the passage of carriages and persons, while ships might be passing through the other into or out of the bafon between the bridges. Another proposal was, to construct a cast-iron bridge of one single arch of 600 feet span and with 65 feet clear opening above high water; as we have already mentioned: these, and other projects for the same purpose were minutely and carefully examined by a select committee of the house of commons, and their reports, together with views of the different proposed bridges, have been since published, and a proposal made for a cast-iron bridge of three arches, resting on stone piers, the centre arch 65 feet high for the passage of ships; in September 1802, the city of London gave notices of their intention to apply for an act of parliament for removing London bridge and building another, but nothing further, we believe, has since been done. *Blackfriars Bridge* is an elegant stone structure, offering scarcely the least impediment to the navigation; it was built in 1770, by Mr. *Robert Milne*; the river in this place is 995 feet wide, it has 9 large elliptical arches, the centre one 100 feet wide, the others regularly diminishing to the outside ones which are 70 feet each. The whole cost of this bridge, in the 10 $\frac{3}{4}$ years during which it was in hand, was 150,840l. *Westminster Bridge* was built of stone in the year 1750; the river in this place

place is 1220 feet wide; there are 17 large, and two small semi-circular arches in this bridge, the centre one 76 feet wide, the others diminishing by 4 feet each in width, to the small ones at the sides; the cost of this bridge and its avenues was 389,500*l.*, and it was about 10 years in hand. At Battersea and at Putney there are narrow, low, and inconvenient wooden bridges over this fine river. On the 4th of June 1783, a handsome and convenient stone bridge was begun over this river at Kew, and in the year 1774, another stone bridge was begun at Richmond. About the year 1801, a new stone bridge was built over this river at Staines, but it was shortly after obliged to be taken down, owing to a settlement therein; an iron bridge was next substituted, and opened on the 3d of September, 1803, of one arch, with 180 feet span, rising only 16 feet above the stone abutments on which it rested; but this, we are sorry to add, has lately suffered the fate of the other, and has necessarily been taken down, a circumstance the more to be regretted, as this was the first cast-iron bridge brought into use in this part of the kingdom. At Walton, there is a curious bridge, consisting of a large wooden opening, and smaller brick arches on each side of it. It may be proper to add, that the intention has very recently been announced, of building a new stone bridge over this river from Vauxhall to Millbank, with a new road over the same from Vauxhall turnpike across Totterdell fields to Pimlico. In the year 1770, and again in 1794, the *Maidenhead and Isleworth* canal was proposed to join this river at Isleworth and at Bolter's Lock, or Taplow mill; in 1792, the *Hampton Gay and Isleworth* was proposed to join at the latter place; in 1801, the *Leatherhead and Thames* railway was proposed to join this river at West Moulsey, and an extension of the Grand Surrey canal was intended to Kingston; in 1802, a cut from the proposed western branch of the *Grand Junction* canal was proposed to join at Ham Haw opposite to the *Wey* river; and, in 1803, the *Portsmouth and London* railway was proposed, to terminate in Stamford street, near Blackfriars bridge.

THAMES AND ISIS NAVIGATION. Act 11, 15, 28, and 35 of Geo. III.—The general direction of this navigation is nearly N. W. by a very serpentine and crooked course of about 110 miles between the counties of Surrey and Berks, and of Bucks, Oxford, and Gloucester: its western end is considerably elevated; its objects are the supply of London and the carriage of coals, and a variety of other articles: near Reading it connects with the *Kennet* river; at Abingdon, the *Wilts and Berks* canal joins this navigation: at Badcock's garden in Oxford, this navigation is joined by the *Oxford* canal, and at Godstow, by the *duke of Marlborough's* cut from the same canal. Oxford is the 38th British town, with a population of 11,694 persons, and Reading is the 55th, with 9,742 persons; Staines, Windsor, Maidenhead, Great-Marlow, Henley, Wallingford, Abingdon, and Lechlade, are also considerable towns on this navigation, which commences in the *Thames* middle part at London-Stone near Staines, and terminates in the *Thames and Severn* canal at Lechlade. From Staines-stone to the water above Bolter's Lock, 15½ miles, is a rise of 34 feet: thence to the entrance of the *Kennet* river 24½ miles, has a rise of 27½ feet, besides the rise at the weirs; thence to the termination to the *Thames* and beginning of the *Isis* river, is about 23 miles; thence to the *Wilts and Berks* canal about 10 miles; thence to the *Oxford* canal about 8 miles, and thence to Cricklade about 29 miles. The Gentlemen of the counties adjoining this navigation are Commissioners for executing, in different districts, the above acts; they have borrowed 60,800*l.* and have expended the

same, over and above the surplus of the tolls, in making 24 side-cuts with opening weirs and pound-locks, with a horse towing-path, and other works for improving this navigation, which is now accomplished, so that very long and wide barges drawing 3 feet 10 inches, can in general pass the same; the rate of tonnage is only ¼ per ton per mile; and an account of the receipts and expenditure on this concern is annually presented to parliament. In 1796, the receipts amounted to 9,839*l.* in 1801, to 10,560*l.* in 1802, to 7,173*l.* Mr. Zachary Allnutt is engineer to the 2d and 3d district of this navigation. In the year 1800, Mr. Wilson prepared a design and model for his Majesty, of a cast-iron bridge, of one arch, proposed to be erected over the *Thames* at Datchet. In the year 1770, the *Reading and Maidenhead* canal was proposed to join this navigation at Sunning, and at Bolter's lock; in 1802, a western branch of the *Grand Junction* canal was proposed to join this navigation at Harleyford near Great Marlow, and crossing the same at that place, it was to proceed to join it again near Reading; and in the same year another branch from the *Grand Junction*, through Aylesbury, was proposed to join this navigation near to Abingdon, and to the *Wilts and Berks* canal.

Thames and Avon Canal. In the reign of Charles II., Mr. Joseph Moxon was employed to survey the line for a canal, and a bill was prepared and brought into parliament, from the *Thames and Isis* navigation at Lechlade, by Cricklade, Malmesbury, Chippenham, and thence by the course of the *Avon* river to Bath, 40 miles in length: in 1754, this design was again revived, with the idea of employing the soldiers upon it; and it was stated that a canal 50 feet wide at top, 30 at bottom, and 4 feet deep, might thus be completed for 1000*l.* per mile.

THAMES AND MEDWAY CANAL. Act 40 and 44 of Geo. III.—The general direction of this canal is S.E. for 8½ miles in the county of Kent; it is level with the ordinary high tides in the river *Thames*: its object is for shortening the voyage of barges from Gravesend to Chatham round by the Nore; Chatham is the 46th British town, with a population of 10,505 persons, and Rochester the 90th, with 6,817 persons; Gravesend is also a considerable town near this canal, which commences in the *Thames* river at Gravesend, and terminates in the *Medway* river at Nicholson's ship-yard in Friendsbury, with a cut from Whitewall on the line of this canal to the *Medway* at Strood, opposite to Chatham royal dock-yard. Tide-locks and entrance basons are to be made at each of the three terminations of this canal; Mr. Ralph Dodd was the projector of this canal, on which Mr. John Rennie and Mr. Ralph Walker have since been employed. In December 1801, this canal was completed from Gravesend to Denton. The company were authorized to raise by the first act 60,000*l.* in 100*l.* shares, and a further sum by the last act, and they are to pay 1*s.* annually to the city of London as conservators of the *Thames* river, for the liberty of connecting therewith, and 1*s.* to the corporation of Rochester, as conservators of the *Medway*, for the same privilege.

THAMES AND SEVERN CANAL. Act 23, 31, and 36 of Geo. III.—The general direction of this canal is East, for 30½ miles in the counties of Gloucester and Wilts: it crosses the *Grand Ridge* by a tunnel; its objects are a communication between the *Severn* and *Thames* rivers, the supply of the country through which it passes with coals, deals, &c. and the export of farming products. Stroud is the 114th British town, with a population of 5,422 persons; Minchinhampton, Cirencester, Cricklade, and Lechlade, are also considerable towns on or near to this canal; which com-

mences in the *Stroudwater* canal at Wallbridge near Stroud, and terminates in the *Thames and Isis* navigation at Lechlade: it has a branch of about 1 mile in length to the town of Cirencester. From the *Stroudwater* canal to Sapperton or Salperton, $7\frac{3}{4}$ miles, is a rise of 243 feet by 28 locks; thence, the summit pound continues through the Tunnel, $2\frac{3}{4}$ miles, to near Coates, and level; thence, to the *Thames and Isis* navigation, $20\frac{3}{4}$ miles, is a fall of 134 feet by 14 locks. The first 4 miles of this canal from Stroud to Brinscombe-port Bafon, is of the same width and depth as the *Stroudwater* canal, and is navigated by the *Severn* boats; the remainder of the line is 42 feet wide at top, 30 at bottom, and 5 feet deep; at Brinscombe-port, goods going eastward are removed into barges 80 feet long and 12 wide, which carry 70 tons each. The famous tunnel on this canal at Sapperton, is 4300 yards long, the arch being 15 feet wide in the clear, and 250 feet beneath the highest point of the hill, which proved to be hard rock, much of which required blasting, and some of it was so solid as to need no arch of masonry to support it; the other parts are arched above, and have inverted arches in the bottom; the cost of excavating this tunnel, in 1788, amounted to 8 guineas per cubic yard. The summit level of this canal is supplied by a feeder brought through lord Bathurst's gardens. Mr. Robert Whithworth and Mr. Joseph Clowes, were the engineers. On the 20th of April, 1789, the Sapperton tunnel was finished, and on the 19th of November of the same year, the whole line was completed and opened. We are sorry to have heard it remarked, that this canal has been conducted through porous gravelly soils, when a line for the same, equally convenient, might have made the cutting fall in a clay soil, and that puddling has been in too many instances neglected or has failed, by which the canal is rendered short of water, and the land and mills have been greatly injured: fanciful round buildings like towers have been made in different places on this canal, for the residence of the lock-keepers. This company were authorized to raise 255,000*l.*, the shares being 100*l.* each; there was a provision that 3 per cent. interest should be paid (out of the principal) to the subscribers on their shares, until the canal was completed and opened; we have heard that the present profits are not much above 1 per cent. No stamps were necessary to the proceedings of this company. The rates of tonnage and the regulations thereof with the *Stroudwater* company, are very long. See *Phillips's 4to. History*, pages 222 to 225. Manures for the adjoining lands are to pass toll free: less than 6 tons not to pass the locks without paying for that weight; $\frac{1}{2}$ mile-stones to be erected. In 1799, this company offered bounties for introducing the coals brought by their canal to the western parts of Oxford and Berk shires. The *Gloucester and Berkley* company are to compensate this company, in case the construction or repair of their works interrupts at any time the communication with the *Severn*. In September 1800, it was intended to make from near Ingletham a forked branch passing Faringdon and Highworth, to connect with the *Wilts and Berks* canal in two places.

THANET'S CANAL. A*ct* 13 Geo. III.—The direction of this canal is nearly N.E. for about $\frac{1}{4}$ of a mile in length, in the West Riding of Yorkshire; it is considerably elevated, near to Skipton, which is a considerable town; it commences in the *Leeds and Liverpool* canal, near Skipton, and terminates at Skipton-castle, lime-stone quarries. It was cut at the private expence of the earl of Thanet, through whose estate alone it passes, except one close: its object is to convey coals to the lime-kilns, and to export lime as a manure and for building.

THYRN AND BURE NAVIGATION. The general direction of these rivers is about N.W. for nearly 30 miles in the county of Norfolk: they are not greatly elevated above the sea in any part: the objects are the import of coals, deals, &c. and the export of farming products. Yarmouth is the 27th British town, with a population of 14,845 persons; Aylesham is also a considerable town on this navigation, which commences in the *Tare* river Yarmouth, and terminates at the town of Aylesham: it has branches from near Thurne and Horning, through the fens and broads, to Hickling and Dilham, about 8 and 10 miles in length.

TIEV RIVER. This river, (sometimes called the Tivey or Teifi river,) has nearly an east course for about 39 miles, between the counties of Cardigan and Pembroke, and Caermarthen in South Wales: its eastern end is considerably elevated: its objects are the supply of Llanbedr and Cardigan, and the export of agricultural products. Cardigan, Kilgerran, Newcastle-in-Emlyn, and Llanbedr, are considerable town on this river, which commences in the tide-way in St. George's channel, and terminates at Llanbedr, or Lampeter.

TONE AND PARRET NAVIGATION. A*cts* 10 and 11 William III. 6 Anne, and 44 Geo. III.—The general direction of this navigation is nearly south, by a bending course of about 27 miles in the county of Somerset: its southern end is considerably elevated: its objects are the import of coals, and the export of agricultural products; at Borough chapel it is joined by the *Parret* river. Taunton is the 106th British town, with a population of 5,794 persons. Bridgewater is also a considerable town on this navigation, which commences in the tide-way in Brigewater-bay, at Start point, in the Bristol channel, and terminates in the *Grand Western* canal at the town of Taunton. In September 1798, a cast-iron bridge was completed, consisting of one arch of 75 feet span over the *Parret* river at Bridgewater, at the expence of 4000*l.* (See our article *BRIDGE*). It was erected in the place of a stone bridge, said to have been built about the year 1300. In 1796, the *Bristol and Taunton* canal was proposed to connect with this navigation at Bridgewater.

Topcliff and Pierfe-Bridge. In June 1801, it was proposed to form a canal from the *Swale* river at Topcliff to Pierfe-bridge on the *Tees* river: the intention of this canal was for supplying the north riding of Yorkshire with Durham coals.

TORRIDGE RIVER. The direction of this river is south for three miles, near to the north-west coast of Devonshire: the tide flows through its whole length: it commences in the *Taw* river near Appledore, and terminates at Biddeford bridge: its object are the supply of Biddeford, a considerable town, with coals, &c. and the export of agricultural products. The spring tides rise 18 feet at Biddeford.

TOVEY RIVER. The direction of this river, (sometimes called the Towey), is north, for about $8\frac{1}{2}$ miles, in Caermarthenshire in South Wales: the tide flows through its whole length: its object is the supply of Caermarthen, which is the 113th British town, with a population of 5,548 persons: it commences in the Bristol channel, at St. Ishmael's, and terminates at Caermarthen bridge. In September 1804, it was intended to apply for an act to improve the port, quays, and dock at Caermarthen.

TRENT RIVER, (lower part). A*ct* 34 Geo. III.—The general direction of this navigation is nearly S.S.W. by a bending and crooked course of about 116 miles, skirting Yorkshire for a short distance, and through the counties of Lincoln and Nottingham, and between those of Leicester and Derby: it is not greatly elevated in any part: its navigation

gation is of vast importance to the country, owing to the many communications which it forms with other rivers or canals: at Keadby it connects with the *Stainsforth and Keadby* canal; at Stockwith, with the *Idle* river, and near the same place with the *Chesterfield* canal; at Torksey, with the *Foss-dyke* canal; at Crankleys, in South-Muskhams, with the *Dean* river; at Trent-bridge, near Holme-pierpoint, with the *Grantham* canal, and the *Nottingham* canal; near Sawley, with the *Loughborough* navigation, or *Soar* river, and the *Erewash* canal. Nottingham is the 17th British town, with a population of 28,861 persons; and Newark is the 91st, with 6,730 persons. Burton-upon-Strather, Gainborough, Newark, Southwell, and Bingham, are also considerable towns near this navigation; which commences in the *Humber* river at Trent-fall, (at the junction of *Ouse* river, and *Market-Weighton* canal,) and terminates in the Upper *Trent* river at Sawley-ferry, at the junction of *Derwent* river, and the *Trent and Mersey* canal. It has a side-cut of 10 miles in length, made in pursuance of the above act, for avoiding 21 shoals, and 2 bridges, which occur in 13 miles of the river between Trent bridge, at the commencement of the *Nottingham* canal, and Sawley ferry, at the commencement of the *Trent and Mersey* canal. This cut (sometimes called *Trent Canal*), has a rise of 28 feet, and it crosses and connects with the *Erewash* canal near Sawley; it has also a short cut and lock into the *Trent* in Beeston. The lower part of this river is through fens, and is embanked on both sides: it is subject to very great floods: the tide flows to Gainborough, so that small vessels can come up to that place; but between this and Wilden-ferry, a great number of shallows occur, owing, in a great measure, to the too great width of the river: Mr. *John Smeaton*, who examined it in 1761, states, that in several places in the common state of the river, in dry seasons, there was not above 8 inches depth of water; that at such times, without the aid of flushes from King's mills upon this river, and the lowest mills upon the *Derwent*, navigation was impracticable. The 33 of Geo. III. for *Grantham* canal required the proprietors of this navigation to deepen the bed of their river, so that there shall always be 30 inches deep of water in the driest seasons for boats to pass between the *Grantham* and the *Nottingham* canals, and by which they may also now pass into the *Trent Canal*, for avoiding the shallows above Nottingham. An act was passed a few years ago for building a new bridge over this river at Gainborough. In 1801 a new stone bridge was intended at Gunthorpe-ford. In the year 1789 and 1790, several acres of land were gained from the wide muddy banks of this river, simply by flaking down rows of furzen faggots thereon, to check the current, and encourage the abundant deposit which this river makes, wherever its waters become stationary; (see *Agricultural Magazine*, vol. vii. p. 98.) a circumstance which proves of immense advantage in many instances, by the warping of land near this river in flood times, to improve it. The flood which happened in the beginning of 1800, forced a new and much straighter course for this river below Gainborough, and occasioned the old crooked channel to be deserted. For making the new side-cut, or *Trent canal*, this company were authorised to raise 23,000*l.* in 50*l.* shares: and they are allowed to collect a variety of tolls on different parts of this cut and the river. See *Phillips's 4to. History, App.* pages 169 and 170. But these were not to take place until 13,000*l.* had been expended under the above act, which embraces the improvement of the river, so that there may be always 30 inches deep of water, the making of horse towing-paths, purchasing the Nottingham hauling-machine, or capstern, &c. The profits of the *Trent canal* are not to exceed 7 per cent. By

the 33 Geo. III. for *Derby canal*, only half the usual rates are to be charged on goods passing only three miles on this river, in their way to or from that canal: and by 33 Geo. III. for *Grantham canal*, this company are to receive 1*½*d. per ton for lime, and 3d. per ton for all other goods (except road-materials and manures), which cross this river, when deepened as above, between the *Grantham* and *Nottingham* canals. In 1760, the *Wilden and Kings-Bromley*, and in 1765, the *Ternbridge and Winsford* canals were proposed to join this river at Wilden-ferry, where the *Trent and Mersey* canal now joins.

TRENT RIVER, (*upper part*). Acts 10 and 11 William III.—The general direction of this navigation is nearly W.S.W. by a crooked course of about 19 miles, in Derbyshire and Staffordshire, and skirting Leicestershire: it is not very greatly elevated above the sea, in any part: its objects are the carriage of coals, and the export of salt, gypsum, earthen-ware, ale, and agricultural products: it connects at Swarkstone with the *Derby canal*, and has the *Trent and Mersey* canal running the whole length almost by its side, and communicating with it at its two extremities. Burton-upon-Trent is the only considerable town on this navigation; which commences in the lower *Trent* navigation at Wilden Ferry (at the commencement of the *Derwent* river and *Trent and Mersey* canal,) and terminates near Burton, at a branch from the *Trent and Mersey* canal. The earl of *Usbridge* is the sole proprietor of this navigation, and all other persons are restricted from erecting or using wharfs or warehouses on its banks without his special consent. The earl or his lessees are entitled to 3d. per ton, on goods navigated on any part of this navigation; which was said, in 1765, to be unimproved, except by the erection of locks at two different mill-weirs; and, more than 20 shallows then existed, over which boats could not pass in dry seasons, without flushes of water: strange stories were at that time related of the conduct of these lessees, and insinuations were made, that a barge loaded with stones was sunk by design in Kings-mill lock, and which lay there almost 9 years, and obliged all goods to be unloaded into fresh boats at that place! happily the rivalry of the canal by its side, renders such an occurrence hereafter unlikely ever to happen. The bridge over this river at Burton-upon-Trent is said to be the longest in England, being 1545 feet long, with 34 arches. It may be proper here to remark, that Mr. *Smeaton*, in 1768, recommended the making of a long bridge or water-road adjoining the lower part of this river, between Mulkham and Newark, that should have 300 yards long of clear water-way through its 72 arches! In 1793, the *Bredon* rail-way was proposed to join this navigation at Weston Cliff; in 1796, the *Commercial* canal, and in 1797, an extension of the *Abby-de-la-Zouch* canal was proposed to connect herewith at Burton.

TRENT AND MERSEY CANAL. Acts 6, 10, 15, 16, 23, 25, two of 37, and 42 Geo. III.—This canal (sometimes called the *Grand Trunk*, or the *Staffordshire* canal,) has its general direction about E.S.E. by a very bending course of 93 miles in the counties of Chester, Stafford, and Derby: it crosses the grand-ridge by a tunnel: its objects are the export of coals, salt, pottery-ware, lime, gypsum, Swithland-slates, agricultural products, &c. and forming parts of the grand inland communications between Liverpool and Manchester, with Hull, Bristol, and London; at Quilton's-wood in Stoke, it connects with the *Newcastle-under-line* canal: at Great Haywood with the *Stafford and Worcester* canal; at Fradley Heath with the detached part of *Coventry* canal; and at Swarkstone it crosses and connects with the *Derby* canal. Although none of the towns on this long canal appear to have so many as 5000 inhabitants, yet Northwich,

Northwich, Middlewich, Sandbach, Newcastle-under-line, Stone, Stafford, Rudgley, Litchfield, and Burton-upon-Trent, on or near to the same, are considerable places. The commencement of this canal is in *Bridgewater's* canal at Preston-brook, and its termination in the *Trent* lower navigation, at Wilden-ferry near Shardlow, the point of junction of the *Trent* canal, or side-cut, the upper *Trent* navigation, and the *Derwent* river: from Etruria, a principal branch (sometimes called the *Caldon Canal*), proceeds by Froghall to Uttoxeter, by a very bending course of about 28 miles in length; from this, at Froghall in Kingsley, there is a rail-way branch of $3\frac{1}{4}$ miles to Caldon-low lime works, also from Stanley-Moss in Endon there is a canal branch of about $3\frac{1}{2}$ miles to the town of Leek, and from Shelton, a short cut to Cobridge: from Stoke-upon-Trent there is a rail-way branch to Lane-end; and from Etruria another to Handley green; from Longport to Dale-hall there is a canal-branch, and the same is continued forwards by a rail-way to the potteries at Burslem; there is a cut 1 mile in length to the *Trent* river near Burton. Near Lane-delph, and in Harecastle there are short cuts or tunnels, extending to the pits or seams of coals. From *Bridgewater's* canal to Middlewich, 18 miles, is a level; thence to near Talk, 11 miles, is a rise of 326 feet by 35 locks; thence along the summit-pound, and through Harecastle tunnel to the Caldon branch at Etruria, 6 miles, is level; thence to the *Stafford and Worcester* canal at Great Haywood, 17 miles, is a fall of about 150 feet and 19 locks; thence to the *Coventry* canal at Fradley Heath, 13 miles, is about 32 feet, and 4 locks; thence to Horninglow wharf, 12 miles, is about 86 feet fall, and 11 locks; thence to the *Derby* canal at Swarstone, 10 miles, is about 16 feet fall, and 2 locks, and thence to the *Trent* river at Wilden-ferry, 6 miles, is a fall of about 32 feet, and 4 locks. From the summit level of the line at Etruria to near Bagnal on the Caldon branch, $5\frac{3}{4}$ miles, is a rise of 75 feet, by 7 locks; thence to Stanley-Moss, 1 mile, is level; thence to Froghall, $9\frac{3}{4}$ miles, is a fall of 61 feet, by 9 locks. From Preston-brook to Middlewich, at the western end, and from Wilden-Ferry to Horninglow near Burton, at the eastern end, the width of the canal at top is 31 feet, at bottom 18, and it is $5\frac{1}{2}$ feet deep; the locks here are 14 feet wide, adapted to river barges of 40 tons burthen; the middle part of the canal, and its branches, are 29 feet broad at top, 16 feet at bottom, and it is $4\frac{1}{2}$ feet deep, the locks being only 7 feet wide; the boats are 80 feet long, 6 feet wide, and carry 18 to 20 tons of lading. There are 16 public wharfs on this canal with warehouses, cranes, weighing-engines, and other necessary conveniences at each. Over this canal there are 258 road and foot bridges, and under it 3 large aqueducts, and 124 lesser ones and culverts. Through Harecastle Hill is a tunnel of 2888 yards in length, and upwards of 70 yards below the hill; this tunnel intersects, and has cross branches to, several veins of coals in the hill, and is also famous for being the first public canal-tunnel constructed in England; the driving of this tunnel, in 1776, cost about 7cs. 8d. per yard run: the height of the arch is 12 feet, and its width 9 feet within. At Preston-on-the-hill near *Bridgewater's* canal is another tunnel of 1241 yards in length; at Barton in Great Budworth is another, 572 yards long; at Saltersford, or Saltersfield, in the same parish, is another of 350 yards long, and there is a fifth tunnel at Armitage, or Hermitage, of 130 yards in length; the heights of these last tunnels are $17\frac{1}{2}$, and their width $13\frac{1}{2}$ feet. At Monks-bridge there is an embankment 13 feet high of $1\frac{1}{4}$ mile in length, and an aqueduct bridge over the Dove river of 23 arches, from 15 to 12 feet wide each. At Alrewas is an aqueduct over the

Trent river, with 6 arches of 21 feet span; and near Middlewich is another aqueduct over the Dane, with 3 arches of 20 feet span. In the Rudyerd vale, N.W. of Leek, near the grand-ridge, is a reservoir of 160 acres extent, with an artificial head 30 feet in height; from this a feeder conducts its water to the Leek branch, and thence into the summit pounds of the Caldon branch, and of the main line: there are four smaller reservoirs near the summit, which measure together 60 acres; all waters within 5 miles of the line are allowed for the use of this canal. The rail-way branch to Mr. Gilbert's Caldon lime-works, made about the year 1777 or 1778, was composed of cast-iron bars pinned down upon rails of wood fixed across wooden sleepers, as we have before described; it appears to have been set out, before the true principles of this excellent mode of conveyance were so well understood as at present, being very crooked and with frequent variations in the angle of its ascent; in the last of the above acts, there is a provision made for varying the line of, and improving this rail-way. It is said to have cost, at first, about 1760l. per mile; in 1794, one horse, we are told, for 9 months in the year, made in each week three journeys on four of the days, and two journeys on the other two days, hauling 3 tons 6 cwt. of limestone down each journey, from the quarries at Caldon to Froghall wharf; for forwarding this stone to the canal at Etruria, the company found boats, the bargeman found his own horse and boy, towing lines, &c. and delivered the stone at 9d. per ton, the distance being about $16\frac{1}{2}$ miles. Mr. James Brindley, Mr. John Smcaton, and Mr. Hugh Henshall were the engineers employed or consulted on the works of this canal, which were begun in July 1766; in April, 1773, the line eastward of Harecastle tunnel was completed, and in May, 1777, the whole line was completed and opened: the Leek branch, the extension of the Caldon branch to Uttoxeter, and the Cobridge branch have been undertaken since the year 1797; the Lane-end, Handley-green, and Burslem branches were projected in 1802. The first act above included 6 miles of the west end of *Bridgewater's* canal, but with a power to assign or make over the same to the duke of Bridgewater, which was accordingly done; the 6th act above assigned 11 miles of the *Coventry* line, between Fradley-heath and Fazeley, to this company, who completed the same, and then sold it in equal moieties to the *Coventry* and the *Birmingham and Fazeley* companies, as before mentioned. This company have been authorized at different times to raise 334,250l. the amount of their shares was 200l. each, until 42 Geo. III., when a division of them was made into 100l. shares. The rates of tonnage are $1\frac{1}{2}$ d. per ton per mile, with reasonable wharfage after 24 hours, on all kinds of goods; but paving and road-materials (lime-stones excepted,) and manures pass toll-free on the pounds and through the locks, when water runs waste over their paddle-weirs. The act 33 Geo. III. for *Derby* Canal, granted some rates to this company on goods crossing this canal or passing out of it into the *Trent* by the *Derby* canal; see *Phillips's 4to. History, Appendix*, p. 58 and 59. In the years 1760 and 1765, the *Wilden and Kings-Bromley*, and the *Tern-bridge and Windsor* canals were proposed through parts of the tract now occupied by this canal: in 1793, the *Sandbach* canal was proposed to join near that place, and the *Bredon* rail-way was intended to be connected herewith near Weston-cliff: in 1796, the *Commercial* canal was proposed, to cross this canal at Horninglow near Burton, and again near Burslem; in 1797, an extension of the *Ashby-de-la-Zouch* canal, to join this at Horninglow was proposed; the design of the two last proposals was, an extension of the wide canals for 40 ton boats, and with the same view a plan was, in 1797, mentioned of widening

widening this canal and its locks, bridges, &c. so that wide boats might pass between Fradley-Heath, and the east-end of Harecastle tunnel.

TWEED RIVER. This river seems to be navigable but about 1 mile from the sea to Berwick bridge, between Berwick liberty and a detached part of Durham county. Berwick is the 82d British town with a population of 7,187 persons; it has a great trade in salmon, which are caught in great quantities in this river, and 40,000 kits of it have been pickled and sent off from this town in one year; 75 to 80 vessels are employed in fishery, and the trade of this place connected therewith. At Berwick there is a stone bridge 947 feet long, with 15 arches over this river. At Kelso several miles higher up on this river, a stone bridge was, in 1798, washed away, and a cast-iron bridge was proposed to be erected in its stead.

TYNE RIVER. Acts 9 and 10 Henry V., 6 and 7 William III., and 41 Geo. III.—The general direction of this river is nearly W.S.W. by a crooked course of about 14 miles between Durham and Northumberland; the tide flows through its whole length; its great object is the export of coals. Newcastle-upon-Tyne is the 10th British town with a population of 36,963 persons, South Shields is the 65th with 8,108 persons, and North Shields the 80th with 7,280 persons; Gateshead is also a considerable town near this river, which commences in the North Sea at Tynemouth, and terminates at Blaydon in Winton. A very peculiar kind of vessels, as before mentioned, is in use upon this river for carrying coals from the waggon-roads, or railways, and staiths to the ships; these are called keels, and are limited (by 11 and 15 Geo. III.) to 25½ tons of lading, or 8 Newcastle chaldrons of coals. From an humane set of Gentlemen resident upon, and concerned in the trade of this river, originated the idea, and they offered a public reward for the *life-boat*, which Mr. *Greathead* brought to perfection, and first tried at the mouth of this river on the 30th of January 1790. (See the article *LIFE-BOAT*). The coals from the numerous coal-mines near this river were formerly delivered to the colliers or coal-ships lying below Newcastle bridge by means of the keels, but of late years several mines have been opened on both sides of the river, and the railways therefrom are conducted to staiths or spouts on the quays, by which means the coals are shot at once into the holds of the ships. Wooden rail-ways were, since about the year 1680, in use between the mines and this river, some of them of considerable length, those to Tanfield-Moor are 10 miles long. In April, 1798, an inclined-plane of 864 yards in length, was opened from Benwell, or Bywell collieries, as before mentioned: in October 1803, a rail-way from Mr. *Temple's* Jarrow mine (128 fathoms deep) was opened to the river. No less than 35 sorts of coals, or rather the produce of as many pits, are usually shipped from this river for London, amounting to 700,000 chaldrons annually: see *Edington's Essay*, &c. p. 31. On some of these mines, immensely large steam-engines are employed; in 1763, a new engine was erected at Walker colliery, with a cylinder 74 inches diameter and 10½ feet long, which weighed 6½ tons, and was calculated to lift 307 cwt. of water by each stroke of its pump. There is an ancient stone bridge of 9 arches over this river, which was greatly damaged by a flood in 1771; in the year 1801, it was suggested to remove as many of its piers as would form a 144 feet opening near the south bank, and to construct an iron arch over the same, high enough for the keels to pass without lowering their masts. The conservators of this river, in pursuance of the last of the above acts, have deepened and improved the same and its quays; in 1801, a new dry, or graving-dock, was opened at South

Shields, capable of receiving ships at neap tides; in 1802, an act passed for building a new light-house at Tynemouth with reverberating lamps, instead of a coal fire blown by bellows, before used. In the year 1798, it was proposed to make a tunnel or road-arch under the *Tyne* river from North to South Shields for the passage of carriages and passengers, and the expence thereof was estimated at 6,993l. In 1795, the *Newcastle and Carlisle* canal was proposed to join this river near Newcastle; in 1796, the *Newcastle and Haydon* bridge, and in or before 1801, the *Newcastle and Maryport* were also proposed. In 1797, and again in 1802, the *Durham and Chester-le-Street* canal was proposed to join this river near Gateshead; and in 1803, the *Tyne and Beamish* canal was proposed through part of nearly the same tract.

Tyne and Beamish Canal. In 1803, it was proposed to make a canal from the *Tyne* river, near Gateshead, through Gateshead, Wickham, Lamesley, and Birtly townships, to Beamish iron works and coal-mines.

ULVERSTONE CANAL. Act 33 Geo. III.—The direction of this short, but large canal, is nearly N.W. for 1½ mile in Lancashire; it is level with high-water at ordinary tides, with a sea-lock at its entrance; its object is to admit ships to Ulverstone town. This canal commences at Hammer-side hill in Morecambe bay in the Irish Sea, and terminates at the new basin and wharfs at Ulverstone; the canal is 65 feet wide at top, 30 feet at bottom, and 15 feet deep; the lock is 112 feet long; at the lowest neap tides there is a depth of 9 feet water at the gates, and at spring tides of 20 feet; a public swing-bridge is built at Hammer-side. That able engineer, Mr. *John Rennie*, was employed on this canal, and completed it about July 1797. This company was authorized to raise 7,000l., the amount of their shares being 50l. each. Coals may be brought to this canal from the *Lancaster* canal, without paying the sea duty; some iron works have been established near Ulverstone since the opening of this canal.

Uppingham Canal. In 1793, it was proposed to make a canal from the town of Uppingham in Rutlandshire, to connect with the *Leicestershire and Northamptonshire Union* canal, and provision is made in its act (33 Geo. III.) for such junctions.

USKE RIVER. The direction of this river is nearly N. for about 4 miles in the county of Monmouth; the tide flows through its whole length; its objects are the export of coals, iron, &c. and the trade of Newport; at Pill-Gwnelly it connects with the *Monmouthshire* canal, and with the *Sirhowy* tram-road; it commences in the *Severn* river at Nash, and terminates at Newport bridge.

Wakefield and Hullet. In September last (1805) notices were given for a rail way from the *Calder and Hebble* navigation at Bottom-boat in Wakefield, to Hullet-hall collieries, with branches to Birtal and Smithic bridge in the west riding of Yorkshire.

WARWICK AND BIRMINGHAM CANAL. Acts 33 and 36 of Geo. III.—The general direction of this canal is nearly N.W. for 25 miles in the counties of Warwick and Worcester; it crosses the grand-ridge without a tunnel; its objects are the supply of Warwick with coals, &c. and forming part of the most direct water communication between Birmingham and London; at Kingswood in Rowington, this canal is joined by a branch from the *Stratford* canal. Birmingham is the 6th British town with 73,670 persons, and Warwick is the 107th with 5,775 persons, on the line of this canal; which commences in the *Warwick and Napton* canal in Budbrook parish near Warwick, and terminates in the Digbeth cut of the *Birmingham and Fazeley* canal at Digbeth near Birmingham; it has a cut of ¼ of a mile to the

the basin at Saltesford in Warwick. From the *Warwick and Napton* canal, about $\frac{1}{2}$ a mile, to near Budbrook town, is level; thence $2\frac{1}{2}$ miles to Hatton, is a rise of about 20 locks; thence to the Stratford branch, about 5 miles, is level; thence to Knowle common, about $4\frac{1}{2}$ miles, is level; thence to Knowle-wharf, 1 mile, is a fall of about 7 locks; thence to near Deritend, about 10 miles, is level; thence to the Digbeth branch of *Birmingham and Fazeley*, $1\frac{1}{2}$ mile, is a rise of about 5 locks. At the termination at Digbeth a flap-lock is erected, which the *Birmingham and Fazeley* company may fasten up, whenever the water in this canal is of less depth than 4 feet at such lock. At Haseley there is a tunnel of 300 yards in length; at Henwood wharf there is an aqueduct over the Blythe river; near Flint Green another over the Cole river; and near its termination at Digbeth another over the Rea river. In May 1796, the northern end of the canal for near 9 miles to Henwood aqueduct was completed and opened; and, on the 19th of December 1799, the whole line was completed and opened. On the 30th of April 1799, a bank of this canal broke, it was said, and the flow of the waters did some damage. This company was authorised to raise 180,000*l.*, the amount of their shares is 100*l.* each. The rates of tonnage will be found in Mr. *John Cary's Inland Navigation*, pages 56 and 57; paving-stones, road-materials, and manures for adjoining lands (except lime), are to pass free on the pounds, or through the locks when the water runs waste. Husbandry boats, not exceeding 5 feet wide, may be used by occupiers of lands; boats less than 70 feet long, or with less than 20 tons of lading, are not to pass the locks without leave. The *Birmingham and Fazeley* company are allowed to take 6*d.* per ton on all goods which pass from that canal to this, until they have paid off 3,600*l.* of their debt, after which they are to take only 5*d.*; they are also allowed 3*d.* per ton on all goods passing from this canal to that.

WARWICK AND NAPTON. Act 34 and 36 Geo. III.—The general direction of this canal, (at first called the *Warwick and Braunston*), is nearly East, for about 15 miles, in the county of Warwick: it is considerably elevated, and terminates near to the grand-ridge, on its West side: its main object is, the opening of the most direct line between Birmingham and London. Warwick is the 107th British town, with 5,775 persons; Southam is also a considerable town near to this canal; which commences in the *Warwick and Birmingham* canal, in Budbrook parish near to Warwick, and terminates in the *Oxford* canal at Napton on-the-hill; near Warwick it crosses the Avon river, on an aqueduct bridge; near Radford and Long-Itchington there are smaller aqueducts. This canal is level with the *Warwick and Birmingham* canal at their junction, and is entitled to the waste water from that canal. This canal was completed on the 19th of December 1799. The company were authorised to raise 130,000*l.*; the amount of each share being 100*l.*, but by the last act above, the holders of the original 1000 shares, were authorised to contribute any further sum, and to be entitled to a proportionate dividend, with original shares, on such addition. The tonnage rates are adapted to the principle, of making goods pay a higher rate for short distances; see *John Cary's Inland Navigation*, pages 59 and 60; paving-stones, road-materials, and manures for the adjoining lands, (except lime), are to pass free on the pounds and through the locks when the water runs waste thereat. Boats less than 70 feet long, or with less than 20 tons of lading, are not to pass the locks without leave. The *Oxford* canal company are entitled to a variety of rates on goods passing out of this canal into that, which see in *Cary*, as above.

WAVENEY RIVER. The general direction of this river

is nearly S.W. by a bending course of about 23 miles, between the counties of Suffolk and Norfolk: it is not greatly elevated in any part; its objects are the import of coals, deals, &c. and export of agricultural products: Yarmouth is the 28th British town, with a population of 14,845 persons; Beccles and Bungay are also considerable towns, on or near this river; which commences in the *Tare* river at Burgh, and terminates at the town of Bungay.

WEAR RIVER. Act 34 Geo. II.—The general direction of this river is nearly S.W. for about 10 miles in the county of Durham; it is not greatly elevated in any part; its principal object is the export of coals. Sunderland is the 34th British town, with 12,412 inhabitants; Durham is the 74th, with 7,530 persons; and Bishops-Wearmouth is the 97th, with 6,126; Monks-Wearmouth and Chester-le-fleet are also considerable towns, on or near this river; which commences in the German ocean at Wearmouth near Sunderland, and terminates at Lumley castle. There is a rail-way of 7 miles in length from this river to Eaton-Main colliery, and a great number of others of considerable lengths, for conveying coals to the staiths and spouts where barges and ships are loaded with them. Eighteen different sorts of coals, or rather the produce of so many different pits, are usually shipped from this river for the London market, amounting in the whole to 195,000 chaldrons annually; see *Edington's Essay on the Coal-trade*, page 31. In 1761, Mr. *John Smeaton* was consulted, about the building of the first lock on this river near Harraton; the sinking of its foundations being thought to endanger the coal-mines which were working under the river at that place, the river was then to be deepened and made navigable, from Briddick-ford to the new bridge, the estimate being 3700*l.* In the year 1802, a new dry or graving-dock was hewn out of the rock on the North side of the river in Monk-Wearmouth. On the 9th of August 1796, a grand iron bridge of one arch, 236 feet span, and 100 feet high above high-water mark, was completed over this river at Wearmouth near Sunderland, as we have already mentioned in this article, and in our article **BRIDGE**. The importance of this bridge, besides its advantage in admitting ships further up the river, will appear from the tolls for passing over it, having been let for the current year at 2080*l.* At the mouth of this river there are two piers for the improvement of Sunderland harbour; in 1802, a new light-house, 70 feet high, was built on the North pier, furnished with reflecting lamps: during tide-time every night, another light is exhibited below the principal one, as a notice to ships of the proper time to enter the harbour. In 1797, and again in 1802, the *Durham and Chester-le-fleet* canal was proposed to join this river near Chester, and thence extend the navigation to Durham.

WEAVER RIVER. Acts 7 Geo. I. and 34 Geo. II.—The general direction of this river is nearly S.E. by a crooked course of 20 miles in Cheshire: it is but little elevated in any part; its objects are the import of coals and Cumberland red iron-ore, and the export of salt and agricultural products: Frodsham, Northwich, and Middlewich, are considerable towns near this river; which commences in the *Mersey and Irwell* navigation, near Weston, and terminates at Winsford bridge: the rise is about $45\frac{3}{4}$ feet by 10 locks: the boats are from 50 to 100 tons burthen: the trustees for this navigation were authorised to borrow money at 5 per cent. interest, and $\frac{1}{2}$ per cent. for the risk; in 1759, the debt amounted to 20,200*l.*, borrowed at 5 and $4\frac{1}{2}$ per cent.: this debt has long ago been paid off; and, there being no private interest in the concern, to the amount of 3000*l.* has been paid in some years, to the county treasurer of Cheshire, to be laid out in amending and repairing the public bridges, and

and in the repair of high-ways leading to the salt-works, agreeable to the directions of the first act. The salt-mines at Northwich are 300 feet deep. In 1804, it was in contemplation to make a side-cut to this river, from near Frodsham, into the *Mersey* at Wellton or Western point, for avoiding the bar or shoal at the mouth of this river.

WELLAND RIVER. Act 34 Geo. III.—The general direction of this river is nearly S.W. for about 37 miles in the county of Lincoln, and skirting the county of Northampton; it is not much elevated above the sea in any part; its objects are the import of coals, deals, &c. the export of Ketton free-stone, Collyweston white slates, agricultural products, &c.; near Crowland it connects with Catwater, a branch of the *Neu* river. Boston is the 102d British town, with 5,926 inhabitants; Spalding, Crowland, Market-Deeping, and Stamford, are also towns of some note on this river; which anciently was navigable for considerable vessels, from Fossdike-wash to Spalding; but owing to the constant changes, which have been taking place in these surprising fens, and their outfall into the wash, we learn, that in 1618, there was not 6 inches' depth of water at low tide in the channel, 2 miles below Spalding; so that when the commissioners of sewers inspected the same, their boat was obliged to be carried in a cart upon the sands for 3 or 4 miles below that town. In 1721, Mr. *Nathaniel Kinderly* (see his *Ancient and Present State*, &c. page 83) recommended the cutting of a new channel, from near the mouth of Glen river to Wyberton near Boston, by which the outfall of this river would be into the channel of the *Witham* river, instead of Fossdike wash. The subsequent contractions of the *Welland* river, by embankments near its mouth, somewhat improved the navigation to Spalding, and delayed until the year 1794 the adoption of Mr. Kinderly's proposed cut: in future the commencement of this navigation is to be in the tide-way of the *Witham* river at Wyberton roads, and it terminates at Stamford bridge. The new cut is to commence near the Ship alehouse in Wyberton, where there is to be a sea-fluice against the *Witham*, for the river and flood waters, with gates pointing to sea and to landwards; the threshold of this fluice is to be one foot below low water mark, and it is to be 50 feet wide in the clear; adjoining to the fluice is to be a tide-lock, for the use of the navigation, 60 feet long, and 8 feet wide, in the clear. From this sea-fluice, the cut is to be continued westward, with a regular ascent in its bottom, to 4 feet below the fill of Vernat's fluice, and is to terminate in the old *Welland* river, near Hooton's Gibbet: the width of the bottom of this new cut is to be 50 feet, and the sides are to batter 2 feet for 1 in height; at the distance of 50 feet from the edge of this cut on the South side, and 30 on the North side, banks 11 feet in height are to be made, to retain the floods and prevent their overflowing the adjoining fens, a precaution which has been adopted through the whole course of the fens. Messrs. *John Hudson*, *George Maxwell*, and *Edward Hare*, are appointed commissioners for setting out, and employing proper persons to execute the new cut, sluices, locks, &c. and are to cleanse the channel of the *Welland* for some distance above the new cut, and erect a sufficient dam across the river below the entrance of the same, at Shepherd's hole, to stop the tide waters and turn the land waters through the new cut; the rates of tonnage for navigating of which, will be found in *Phillips's 4to. History*, App. page 179. A bridge is to be built over the new cut at Fossdyke Inn: at Crowland, there is a most ancient and curious bridge on this river, springing from three different abutments, and meeting in the middle. See our article **BRIDGE**. In 1797, it was stated that 10,000*l.* had been subscribed for carrying the above new cut and improve-

ments into effect; and we hope that ere long the same will be completed. Trustees are appointed in the above act, for receiving the tolls and maintaining the works when completed by the commissioners. The greater part of the course of this navigation from Spalding to near Peakirk upwards, and from Market-Deeping to Stamford, is by modern cuts, on the north-west side of the old river, for avoiding its imperfect channel.

Wellspring and Leominster. About the year 1794, a canal was proposed from the *Montgomery* canal and *Severn* river near Wellspring, to the *Leominster* canal at Woferton; passing Bishops-Castle and Ludlow in its course.

WEY RIVER. The general direction of this river, is nearly S.S.W. for 20½ miles in the county of Surrey; it is not greatly elevated; its objects are the import of coals, deals, &c. and the export of chalk and agricultural products; at Westley near Weybridge, it is joined by the *Basingstoke* canal. Godalmin, Guilford, and Chertsey, are considerable towns on or near to this navigation; which commences in the *Thames* river at Ham-Haw near Weybridge, and terminates at the town of Godalmin. From the *Thames* to Guilford bridge, 15½ miles, is a rise of 86½ feet; in this part the channel of the river was very early improved by side-cuts, and pound-locks, (said to be among the first erected in England, and to have been introduced by Sir *Richard Weston*); from Guilford bridge to Godalmin, is a canal 5½ miles, with a rise of 32½ feet; which is supplied by a feeder from the Wey at Godalmin. In 1791, and again in 1803, this navigation was proposed to be joined near Godalmin by a canal from the *Itching* river, (see *Portsmouth and Croydon*). In 1800, the *Grand Surrey* was proposed to be extended to this river near Westley; and in 1802, a branch from the *Grand Junction* canal was intended to connect with this river by means of the *Thames* at Ham-Haw.

WHARFE RIVER. The general direction of this river is nearly N.W. for about 9 miles, between Ainsty Liberty and the West Riding of Yorkshire: it is not much elevated above the level of the sea: its objects are the carriage of coals, free-stone, &c. and the export of agricultural productions. Tadcaster and Cawood are considerable towns on or near to this river, which commences in the *Ouse* river near Cawood, and terminates at the town of Tadcaster.

WHITEHAVEN BROOK. This brook is navigable but a very short distance, in a S.E. direction at its mouth, which is wide, constituting the harbour of Whitehaven in Cumberland: its chief object is the export of coals, lime, and free-stone. This harbour, situate on the Irish sea, has had several acts passed for its improvement, viz. 7 and 10 Anne, 12 Geo. II., 13, 2, 28, 32, and 45 Geo. III. and in September last (1805) notices were given for a further application to parliament. Whitehaven is the 62d British town with 8,742 inhabitants. Mr. *John Smeaton* was consulted in 1768, on the building of a north pier, and extending the southern one within 200 feet of it. In 1796, a violent storm happened, which considerably damaged the quays of this harbour. There are several rail-ways from this harbour, to the famous coal-mines in its vicinity. On the 4th of August 1738, the first rail or waggon-way was opened at this place, leading to Harriethwaite and Woodhouse collieries. In 1802, the Hen-fingham lime-works were opened. On the 9th of August, 1803, the rail-way, 700 yards in length, passing over Brantfarch, or Road-bridge, to Howgill and Whingill coal mines, were opened: and in the same year those of Brackenthwaite mine were opened. On 23d March last (1805) the William Pit, at 750 yards distance from the north wall of the harbour, was opened. Some of the veins of coals in these pits are 7½ to 12 feet thick, and from the whole of them 900 tons or upwards of coals are raised daily: one of these

mines extends $\frac{2}{3}$ of a mile under the sea, at about 600 feet beneath its bottom; inclined planes, 200 fathoms long, being used, for drawing up boxes of coals and others of water, from the extremities of these workings under the Sea, to the bottoms of the shafts; these boxes are drawn up the planes by horse gins; for which purpose, and dragging the coal-waggons to the shafts, 100 horses are constantly employed under ground in these pits. The fire-damp often proves fatal to the men and horses employed in these works. There is a fine white free stone quarry on the west side of the harbour.

Wibsey and Dewsbury. In 1802, a rail-way was proposed from the *Caldar and Hebble* navigation at Ravensbridge in Dewsbury, to Low-moor iron-works in Wibsey, about 7 miles in length.

Wilden and King's-Bromley. In 1760, the line for a canal was surveyed by Mr. *James Brindley* and Mr. *John Smeaton*, from the *Trent* river at Wilden-ferry to King's-Bromley near Litchfield, 25 miles, with a rise of 110 feet by 19 locks, with a branch therefrom to Longridge near Burslem, $30\frac{1}{2}$ miles, with 166 $\frac{3}{4}$ feet rise, by 28 locks; from which last a level branch was again proposed of $3\frac{1}{2}$ miles, to Newcastle-under-line: another branch of $2\frac{1}{2}$ miles, to Litchfield mill-pool, 18 feet rise, and 3 locks, and thence $\frac{1}{2}$ a mile farther with 30 feet rise, and 5 locks: another level branch was proposed of 10 miles, to Fazeley near Tamworth, and thence $\frac{1}{2}$ a mile, to the Tame river, 17 feet rise, by 3 locks. This canal was intended to be 24 feet wide, and $2\frac{1}{2}$ deep, with fords instead of bridges: the estimate was 100,200*l.* Mr. *Smeaton* suggested an extension of this canal, over Harecastle-hill, by deep-cutting, with reservoirs and steam-engines, for supplying the summit. The *Trent and Mersey*, *Newcastle-under-line*, and *Coventry* canals have since accomplished what this scheme had in view.

WILTS AND BERKS CANAL. Acts 35 and 41 Geo. III.—The general direction of this canal is nearly N.E. by a bending course of about 52 miles, in the counties of Wilts and Berks: it crosses the grand ridge at the foot of the chalk-hills without any tunnel: its objects are the import of coals from both its extremities, the export of farming products, &c. Abingdon, Wantage, Swindon, Wotton-Basset, Chippenham, Calne, Melksham, and Trowbridge, are considerable towns on or near to this canal, which commences in the *Kennet and Avon* canal at Semington, and terminates in the *Thames and Isis* navigation at Abingdon. It has a cut of about $1\frac{1}{2}$ mile to Chippenham, one of about 3 miles to Calne, and another of about 1 mile to Wantage: the summit-level extends from near Wotton-Basset, to near the extremity of Wilts. The locks are calculated for long, narrow boats. On the Calne branch there is a short tunnel, under the road at Cuninghams park; and a principal aqueduct-bridge over Broadtown brook near Wotton-Basset. The rise of the road over the canal bridges is nowhere to exceed 3 inches in a yard; the springs and streams within 2000 yards may be taken; the use of inclined-planes instead of locks is provided for in the act; but they will not be necessary, the canal being generally cut through clayey soils that have plenty of water: half-mile stones are to be erected on the canal banks. The company have been authorized to raise 311,900*l.* the amount of shares being 100*l.* each. The inhabitants of Calne made an offer, in August 1799, we are told, to cut the branch to that town, on being allowed the tolls thereon for so doing. In August 1799, the western end of the line was completed and filled, and on the 1st May 1801, by the completion of the *Kennet and Avon* to Semington, the junction was formed, and 22 miles of the line to the aqueduct near Wotton-Basset, with the Calne and Chippenham branches, have since been used, prin-

cipally in bringing in Somersetshire coals. In September 1800, two branches of the *Thames and Severn* canal, by Faringdon and Highworth, were proposed, to join this canal at Uffington and Shrivenham. In 1803, the Aylesbury branch of the *Grand Junction* canal was proposed to connect with this canal by means of the *Isis* river at Abingdon.

Winston and Stockton. In 1768, Mr. *James Brindley* and Mr. *Robert Whitworth* surveyed the line for a canal from the *Tees* river at Stockton in Durham county; passing Hartburn, Cothams-flob, Moor-house, Oak-tree, Maiden-dale, Bank-top, Darlington, Cockerton, Lower-Walworth, Legg's-crofs, Killerby, and Staindrop, to Winston: with a branch $1\frac{1}{2}$ mile from Lower-Walworth to the *Tees* at Pierse-bridge; another from Darlington, 3 miles to Croft-bridge on the *Tees*; and another from Cothams-flob, 2 miles to the *Tees* at Yarm. The rise from Stockton to Winston is 328 feet. A feeder was to be taken from the *Tees* river, 3 miles above Winston. The export of coals, lime, and lead, was the object of this proposed canal.

WISBEACH CANAL. Act 34 Geo. III.—The direction of this canal is nearly S.E. for 6 miles, in the counties of Cambridge and Norfolk; it is but very little higher than the sea, being embanked through the level fens: its object is a communication between Wisbeach and Lynn, instead of an old part of the *Nen* river near it, which is almost grown up. Wisbeach is the only considerable town near this canal, which commences in the *Nen* river at the old sluice in Wisbeach, and terminates in the *Nen* river again at Outwell (at the commencement of Well-creek, a branch of that river leading to the great *Ouse* river): it is straight and level, having flood locks at its extremities. This company were authorized to raise 20,000*l.* the amount of each share being 10*l.* All goods entering or passing out of this canal are to pay 3*d.* per ton, except government stores and baggage, road-materials, manures, and materials for the use of the Fen-Corporation: husbandry boats may also be used toll free, but not pass the locks. The commissioners for the *Nen* navigation are to have 100*l.* out of these tolls, and the remainder, after paying interest on the debt, is to be applied in the repair and improvement of Well-creek.

WITHAM (old) RIVER. Act Geo. II.—The general direction of this river is nearly N.W. for about 41 miles in the county of Lincoln; it is but little elevated above the sea in any part: its objects are the import of coals, deals, &c., the export of farming products, and forming part of the inland communication between Lynn and Hull, Liverpool, Manchester, &c. Near Tattershall it is joined by the *Horncastle* navigation; at Chapel-hill by the *Sleaford* navigation; and at Wyberton roads the new outfall and navigation of the *Welland* river are to join this river. Lincoln is the 76th British town, with a population of 7,398 persons, and Boston is the 102d, with 5,926 persons; Tattershall is also a considerable town near this river; which commences at the Scap or Scalp in the tide-way of Boston deeps in the Wash, and terminates in the *Fossdyke* canal, or new navigation at Brayford Meer. This river below Boston, about 4 miles, was anciently so deep, and was so much frequented by ships, that in the 6th year of king John, when the merchants of London paid only 83*l.* as a tax on their lands and goods, Boston contributed 780*l.* A gradual decay and silting up of the channel and harbour took place to such a degree, that when in 1761 Messrs. *John Grundy*, *Langley Edwards*, and *John Smeaton* examined the state of this navigation, and of the drainage of the adjoining fens, through which this river is embanked on both sides through nearly its whole length, owing to the long neglect of the banks, which should have confined the returning tide and the land-waters, so as to scower the channel, they reported that 30

ton barges could then scarcely reach Boston, while the navigation above that town was entirely lost, and the ancient channel was in several places entirely grown up and abandoned by the water, in its ordinary state. Mr. *Smeaton* then recommended the erection of a sea-fluice upon this river below Boston, the fill thereof as low as low-water, with 3 openings, amounting to 50 feet wide; these to be furnished with doors pointing to sea-ward, and draw-gates behind them gauged, or having their tops, two feet below the surface of the fens, for always retaining a proper quantity of water in the river in dry seasons; also a sea-lock at the same place for the navigation, furnished with three pair of gates, two of them pointing to the land and one to the sea: the straightening, enlarging, and deepening of the river above Boston to 80 feet at top, 50 at bottom, and 10 feet deep, were recommended, and the erection of three pound-locks, furnished with flood-gates or opening-weirs adjoining, below Lincoln, and one other such lock above. The estimate for such of these works as related to draining, was 38,000*l.*, and for the navigation works 7,370*l.* It was remarked that Lincoln high-bridge had but 15½ feet clear width of water-way, above which a hard gravelly place, probably an ancient ford, called Brayford head, covered frequently with only 3 feet of water, acted as a weir for holding up the waters of Brayford meer and the *Fossdyke* canal. When Mr. *Smeaton* was afterwards consulted in the year 1782, he objected to a navigation lock which had been in the interim erected below Lincoln town, and recommended the cutting off the communication between *Fossdyke* canal and Brayford meer, by a pound lock with gates pointing to the canal, and to deepen this river through and above Lincoln bridge, and to remove Brayford head, so as to lower the water in Brayford Meer: the principal wharfs appear to have been since made, and the trade of Lincoln is now carried on upon this meer or water. By the act of 32 Geo. III. for *Horncastle* and *Sleaford* navigation, those companies were required to contribute equally with this company in the expences of deepening and improving this river through Lincoln high-bridge, and thence to the *Fossdyke* canal, in the next 7 years; in consequence of which, goods passing on this river to or from the *Horncastle* or *Sleaford* navigations, are to pay only half the accustomed rates on this river. In 1803 it was in contemplation to further improve the navigation of this river below Lincoln. Much has been written on a prohibition said to exist against the shipping of coals from this river, on account of its preventing a rivalry with Newcastle and Sunderland coals in the London market, by the produce of the Yorkshire, Derby, and Nottingham mines being brought by the *Trent*, the *Fossdyke*, and this navigation, to Boston deeps; an expectation not much better founded, we fear, than that the opening of the *Stover* canal would have any effect on the London coal-market.

WORCESTER AND BIRMINGHAM CANAL. Acts 31, 38, and 44 of Geo. III.—The general direction of this canal is nearly N.E. for 29 miles in the counties of Worcester and Warwick; it crosses the grand-ridge by a tunnel: its objects are the export of coals, and a more direct communication between Birmingham and the *Severn* river: at Selly Oak it is joined by the *Dudley* canal, and at Kings Norton by the *Stratford* canal. Birmingham is the 6th British town, with a population of 73,670 persons; Worcester is the 40th, with 11,325 persons; Bromsgrove and Droitwich are also considerable towns near this canal; which commences in the *Severn* river at Diglis just below Worcester, and terminates in the old *Birmingham*, and the *Birmingham* and *Fazeley* canals, at their junction at Farmers bridge at the upper end of the town of Birmingham. From the *Severn* to Tardebig, 15 miles, is a rise of 428 feet by 71

locks: thence to the *Birmingham* canal, 14 miles, is level. The width of the canal at top is 42 feet, and the depth is 6 feet; the locks are 80 feet long and 15 feet wide; the boats are of 80 tons burthen. At Worcester there is a very fine basin for the canal boats. There are 4 or 5 principal, and several smaller culverts: the principal tunnel at West-Heath is 2700 yards long, 18 feet high, and 18½ feet wide within the arch, the depth of water therein is 7½ feet; at Tardebig is another of 500 yards in length; at Shortwood is another of 400 yards in length; at Oddingley one of 120 yards; and, at Edgbaston another of 110 yards in length: four of these tunnels are upon the summit-pound. Near Coston-Hacket there is an immense piece of deep cutting; in 1794, Mr. *Carne's* machine worked by a horse at length, was used for excavating the soil, instead of wheeling it out in barrows. Where the summit-pound of this canal connects with the *Birmingham*, the *Dudley*, and the *Stratford* canals; stop-locks are erected, which the several companies may shut and lock up, when the supplies of this or the other canals fail, so as to endanger the lowering of the summit-pound, to obstruct the navigation. Mr. *John Smeaton* was one of the engineers to this canal, the scheme of which was laid, and a bill was brought into parliament in 1790, but the opposition of interests, and natural difficulties of this vast undertaking then proved fatal to it; the great anxiety and fatigue which Mr. *Smeaton* underwent in this arduous undertaking, are thought to have injured his health and to have shortened the days of that very able and excellent man. In May 1796, the eastern end of this canal, as far as the *Stratford* canal at Kings-Norton, was completed. The arching of the West-heath tunnel was begun on the 28th of July 1794, the whole of it was turned by the 25th of February 1797, (1780 yards of it having been completed in the year 1796) and in March 1797, the navigation was extended through it to Hopwood wharf, and in the following year, the same was extended to the western end of the summit-pound at Tardebig. The company were authorised by their two first acts to raise 399,929*l.* 1*s.* 1½*d.*: their whole shares being made hereby, of the odd value of 138*l.* 17*s.* 9*d.* each: these were said to be depreciated in value almost to nothing; but in 1802, they had risen to 40*l.* each. The last act was for raising a further sum of money for completing the very difficult part of the line, and supplying lockage-water, by steam-engines to pump it up from the *Severn*, by reservoirs, &c. which yet remains to be accomplished. The rates of tonnage owing to the several junctions with neighbouring canals are very complicated; see *Cary's Inland Navigation*, pages 68 to 70. Two-pence per ton is charged on goods entering the Worcester basin from the *Severn* river, to be there unloaded. This company guarantees the future profits of the *Droitwich* company to the extent of 5 per cent. annually on each share, and those of the *Stourbridge* company to 9*l.* per cent. on each share: they are also to compensate the water-bailiff of Worcester for his dues on coals sold on the *Severn* at Worcester; they are also to pay to George Perrot esq. as owner of the *Stratford Avon* navigation, 400*l.* per annum for loss of his tolls on the upper part of that river by the making of this and the *Stratford* canal, besides making up any deficiency there may hereafter be, in his rents of 1227*l.* for the tolls on the lower part of that river. About the year 1793, a branch was proposed, it appears, from this canal near Hanbury-Hall to the *Droitwich* canal at that town.

WYE RIVER. The general direction of this rapid and romantic river is nearly N.W. by a very bending and crooked course of about 85 miles, in the counties of Monmouth and Hereford, and Brecknock, in South Wales, and skirting

C A N A L.

the county of Gloucester: its northern end is considerably elevated: its objects are the carriage of coals, and the export of agricultural products; at Hereford it is approached very near, if not joined, by the *Hereford and Gloucester* canal. Hereford is the 80th British town, with a population of 6,828 persons: Chepstow, Colford, Monmouth, Ross, and Hay are also considerable towns on or near to this river; which commences in the *Severn* river at Beachley, and terminates at the town of Hay. The tide often rises in the mouth of this river, to the extraordinary height of 40 feet; Chepstow bridge over the same, is of great height above the water at low tide. In 1802, and again in 1804, it was in contemplation to make a horse towing-path by the side of this river, and by deepening the shallows in several places to improve its navigation. In 1802, the *Dean-Forest* railway was proposed to join this river at English-Bichnor, we believe; in the same year notices were given, for an intended rail-way from this river at Hereford, to join the same again opposite to Lydbrook; and in March last (1805) another railway was proposed from this river to the *Monmouthshire* canal.

WYRLEY AND ESSINGTON CANAL. Acts 32 and 34 Geo. III.—The general direction of this canal is nearly S.W. by a very crooked course of 23 miles in the county of Stafford: it is considerably elevated, and terminates at its western end near, or upon the grand-ridge: its object is the export of coals, iron, and lime, which abound in its course: Wolverhampton is the 33d British town, with a population of 12,565 persons; Litchfield and Walsall are also considerable towns on or near to this canal; which commences in the detached part of the *Coventry* canal at Huddlesford (near to Whittington brook, and the commencement of the *Birmingham and Fazeley* canal) and terminates in the old *Birmingham* canal near Wolverhampton: there is a branch of $5\frac{1}{2}$ miles to Hay-head lime-works; another of $2\frac{1}{2}$ miles to Lord's-Hay coal-pits; another of near 4 miles at Wyrley-bank collieries, with a branch from this last near 1 mile to Essington new collieries; there is also a branch $\frac{1}{2}$ a mile to near Walsall town, which terminates within $\frac{1}{2}$ a mile of the branch of the old *Birmingham* thereto. From the *Coventry* canal to near Cannock-Heath reservoir, $7\frac{1}{2}$ miles, is a rise of about 264 feet, by 30 locks; thence to the old *Birmingham* canal, $15\frac{1}{2}$ miles, is level; the Lords-Hay, Hay-head, and Walsall branches are all level with the long pound: the Wyrley branch rises about 36 feet, by 6 locks, in the first $\frac{1}{2}$ mile, the remainder thereof is level, and thence from the Essington branch rises about 24 feet, by 4 locks. This canal is 28 feet wide at top, 16 at bottom, and $4\frac{1}{2}$ feet deep. No water is to be taken from the old *Birmingham* canal, but a lock is erected at the junction, and this canal is to be constantly kept 6 inches higher than that, or all boats are to be stopped, by a man stationed there for that purpose: the surplus water from this is to be vented into the old *Birmingham* canal. Litchfield water-works pipes were to be carefully guarded in cutting this canal. Branches of 5 miles in length may be made to this canal by the owners of the mines, if they waste no water. Mr. William Pitt was the engineer: and the canal and works were long ago completed. The company were authorized to raise 160,000*l.* the first 35,000*l.* in 125*l.* shares; on the extension of the canal in 1794, the company were required to purchase the shares of certain discontented proprietors: the new shares are 100*l.* each. The rates of tonnage will be found in Mr. John Cary's *Inland Navigation*, p. 47 and 48. Less than 20 tons in a boat is not to pass the locks without paying for that lading, except empty boats on their return. In 1792, it was proposed to make a branch to Stow-heath, and two others into Ashmore-park.

YARE RIVER. The direction of this river is nearly W.

by a bending course of about 22 miles, in the county of Norfolk: it is not much elevated in any part; its objects are the import of coals, deals, &c. and the export of agricultural products: at Yarmouth this river is joined by the *Thyrn* river, and at Burgh by *Waveney* river. Norwich is the 11th British town, with a population of 36,854 persons, and Yarmouth is the 28th, with 14,845 persons; there are no other considerable towns near this river; which commences in the German Ocean at Gorleston-fort, and terminates at the water-works and mill in Norwich: at Yarmouth there is a draw-bridge for admitting masted vessels above it. The quay of this port is $1\frac{1}{2}$ mile in length, and in some parts 150 yards in breadth: a curious kind of low carriages called Yarmouth-Carts are used for conveying the goods from the quay to the warehouses. In 1804, St. Michael's Coffany bridge over this river in Norwich city was taken down, and a cast-iron bridge erected by Mr. Frazer in its stead. In 1785, and again in 1802, the *London Lynn and Norwich*, or North London canal, was proposed to join this river at Norwich.

YORE RIVER. Act 7 Geo. III.—This river, sometimes called the Ure river, has nearly a N.W. direction for about $8\frac{1}{2}$ miles in the West, and skirting the North Riding of Yorkshire: its objects are the supply of Borough-bridge and Ripon, and the export of agricultural products: at Myton it is joined by the *Swale* river. This navigation commences in the *Ouse* river at Linton, and terminates in the *Ripon* canal at Milby. From the *Ouse* to the *Ripon* canal, is a rise of 11 feet; at Linton river is a lock, and a dam or weir so made up as to allow about 1 inch per mile in this distance, for a stream navigation. Mr. John Smith was the engineer, who in 1767 referred to Mr. John Smeaton for his opinion on the height of Linton dam, and other matters relating to the works then going on.

For further illustrating this part of our subject, we intend to give a map of the British islands, sufficiently large to distinguish all the navigable rivers, canals, rail-ways, harbours, &c.; and having adopted a method, by which the inconveniences of large folding-maps will be avoided, and yet perfect facility be given, of reference from any page of the map to the other, this will probably be the first of a series of maps, for describing more particularly than has yet been done, several useful and curious particulars relating to the topography and present state of our own country.

CANAL, *Canalis*, in *Anatomy*, is a term applied to several tubular cavities in the bones, and the soft parts of the body.

CANAL of the lower jaw, a considerable excavation under the sockets of the teeth, in which the nutrient vessels and nerve of the teeth are lodged. See **SKELETON**.

CANAL of Fontana, a small channel in the ligamentum ciliare, between the sclerotic and choroid coats of the eye. See **EYE**, *Anatomy of*.

CANAL of Petit, *Canalis Petitianus*, is formed in the anterior part of the membrana hyaloidea, round the margin of the crystalline lens. See **EYE**, *Anatomy of*.

CANAL of the vertebra, a large tube, containing the medulla spinalis, formed in the posterior part of the vertebrae; and extending from the occiput to the sacrum. See **SKELETON**.

CANAL, in *Architecture*, is applied to the furrows on the face of, or underneath a capital, sometimes also called porticos; and fitted up with reeds or flowers; sometimes to those cavities, straight or winding, made on the caulicoles of a capital. See **SOFFITA**.

CANALS are also used for the flutings of a column or pilaster.

CANAL of the volute, in the Ionic capital, is the face of the circumvolutions, inclosed by a listel.

CANALE,

CANALE, in *Geography*, the chief town of a canton of the same name in the department of Gole, or island of Corfica, and district of Bastia, containing 1087 inhabitants.

CANALES, in *Ancient Geography*, a place of Italy, in that part of Magna Græcia called Messapia, 30 miles from Lapatia, near the gulf of Tarentum. Anton. Itin.

CANALICIUM aurum, or CANALIENSE, that gold which is dug out of mines, or veins under ground.

CANALICULATA, in *Conchology*, a species of BULLA, described by Linnæus, the shell of which is cylindrical, and the whorls of the spire grooved. Obs. This is brownish or testaceous, clouded with a paler colour. Native place unknown.

CANALICULATA, in *Entomology*, an African species of BUPRESTIS, of a dusky colour, with entire wing-cases; abdomen grooved beneath; tail armed with four teeth: Fabricius.

CANALICULATE leaf and stalk, in *Botany*. See LEAF and STALK.

CANALICULATUM, in *Conchology*, a species of BUCCINUM, the shell of which is spotted, and the whorls of the spire canalculated. Argenville, &c. The spire consists of 17 whorls. Its native place is unknown.

CANALICULATUS, a species of TURBO found in India. This shell is fuscated, and transversely striated; colour white, varied with green, and sometimes chestnut; whorls of the spire six, and very convex. Chemnitz, &c.

CANALICULATUS, in *Entomology*, a species of CERAMBYX (*Prionus*) found in the West Indies, but rarely. The thorax is crenated at the margin; dorsal groove villose and white; antennæ short. Fabr. This interesting species is described by Fabricius from a specimen in the museum of Dr. Hunter; another occurs in the cabinet of Mr. Donovan.

CANALICUM, in *Ancient Geography*, a place of Italy in the Aurelian Way, in the passage from Rome to Arelatum by the Maritime Alps, 12 miles from Vada Sabbatia; (Anton. Itin.) it is also called *Canalium*, and is marked in the map of M. d'Anville in Liguria, towards the N.W. of Savo.

CANALIS, in *Entomology*, a species of BRUCHUS, of a small size, that inhabits India. The colour is somewhat ferruginous; wing-cases black at the tip; tail black; central line white. Fabricius.

CANALIS is used by Surgeons for an oblong, concave instrument, in which to put a broken limb, leg, or thigh. It is made either of brass, wood, or earthen ware, sometimes even of straw fitted with linen cloth.

CANALIS arteriosus, in *Anatomy*, the vessel which joins the trunks of the pulmonary artery and the aorta in the fœtus. See FŒTUS.

CANALIS carotideus, a canal in the petrous portion of the temporal bone, through which the internal carotid artery enters the cavity of the cranium, and a small nerve passes from the sixth pair to the superior cervical ganglion of the great sympathetic nerve. For the description of this canal, see SKELETON.

CANALIS medius, the canal of communication between the third and fourth ventricles of the brain. See BRAIN, description of.

CANALIS nasalis, the tube which conveys the tears from the lacrymal bag into the nose. See EYE, Anatomy of.

CANALIS uteri. See VAGINA.

CANALIS venosus, a branch of the umbilical vein, which terminates in one of the hepatic veins in the fœtus. See FŒTUS.

CANALIS Trajanus, and CANALIS Ptolemæus. See CANAL, supra.

CANALS, semicircular, of the petrous portion of the temporal bone. See EAR.

CANALUVII MONTES, in *Ancient Geography*, moun-

tainous of Macedonia, so called by Ptolemy, and supposed to be the same with the *Cambuvii* of Livy, and the *Candavii montes* of Pliny and Strabo; situate in the country called *Candavia*.

CANANDAQUA, in *Geography*, a post town, lake, and creek of America, in Ontario county and state of New York. It is the shire town of the county, seated on the north end of the lake of the same name, at its outlet into Canadaqua creek. The lake is about 20 miles long and 3 broad, and conveys its waters in a N.E. and E. course, 35 miles, to Seneca river. This is the site of an ancient Indian town of the same name, and stands on the road from Albany to Niagara, 16 miles W. of Geneva, and 235 miles N.W. from the city of New York. It is now in a flourishing state. By the state census of 1796, there appeared to have been 291 electors in this township.

CANANEA, a small oblong island of Brazil in South America, belonging to the Portuguese, opposite to the mouth of Ararapiza river; on the south of which stands the town of Cananea, guarding the entrance of the bay. The island lies about 37 leagues from St. Vincent. S. lat. 25° 10'. W. long. 47° 12'.

CANANGA, in *Botany*, Jussieu p. 284. Aubl. Guian. tab. 244. Class and order, *polyandria polygynia*. Nat. Ord. *Anonæ*, Juss. Ess. Ch. Petals small, germs numerous, capsules or berries egg-shaped, peduncled, one-seeded. Jussieu observes, that the plant for which Aublet formed this genus, is probably a congener of Sonnerat's *uvaria longifolia*; Ind. 2. p. 233. tab. 131. and also of Aublet's own genus *Aberemo*, whose large berries have short partial peduncles. La Marck has united Aublet's Cananga to the Linnæan genus *uvaria*, which he calls in French Cananga, (see *UVARIA Monosperma*) and has of course also admitted Sonnerat's *uvaria longifolia*. Aublet's *Aberemo*, which was accidentally omitted in its proper place in this work, is considered by La Marck as a distinct genus nearly allied to *uvaria*, but not yet fully described, having been seen by Aublet only in fruit. The fruit of *Aberemo* is said by Aublet to consist of a roundish head of dry, egg-shaped, one-celled, one-seeded berries, supported by a common peduncle two or three inches long. It is produced by a tree which is a native of Guiana, the bark of which is blackish; the wood white and hard; and the leaves alternate, simple, about a foot and half long, and five or six inches broad, lanceolate egg-shaped, acuminate, rather thick, firm, pubescent, entire.

CANANI, in *Biography*. See CANANUS.

CANANO, in *Geography*, a town of Naples, in the province of Calabria Ultra; 2 miles S.S.E. of Reggio.

CANANOR, a sea-port town of Hindooistan, on the western coast of Malabar. It was taken possession of by the Portuguese towards the close of the 15th century; and about the year 1506, Almeyda, the first Portuguese viceroy of India, obtained consent of the king of the country to build a fort, and to secure it with a garrison. From that time it became a large and populous city, inhabited chiefly by Mahometans, and carrying on a very considerable trade. In the year 1663, it was taken by the Dutch, who, considering the convenience and importance of its situation, established a factory there. The adjoining country supplied abundance of rice, sugar, pepper, and other valuable commodities; so that no less than 200 ships arrived annually in this port. However, the Dutch sold it in the year 1770 to the sultan of Anchediva or Angeoliva, for the sum of 100,000 rupees. It was taken by the English, under general Abercrombie, on the 17th of December, 1790. Cananor is distant 15 miles N.E. from Tellicherry, and 100 W.S.W. from Seringapatam. N. lat. 11° 55'. E. long. 75° 14'.

CANANUS,

CANANUS, JOHN BAPTIST, in *Biography*, one of the restorers and improvers of anatomy, was born at Ferrara, in Italy, in the year 1515, where he acquired so much reputation for his skill in medicine, that he was invited to Rome by pope Julius III., who made him archiater, and his principal physician. On the death of the pope he returned to Ferrara, and pursued his anatomical researches. He first discovered the valves of the veins, which were afterwards more completely described by Vesalius. The work by which he is known, of which only four complete copies are said to be in existence, is "*Musculorum humani corporis picturata dissectio*," 4to. printed, Haller thinks, in 1543, no date, or place named. The figures, 27 in number, are neatly engraved on copper. They represent the muscles of the upper extremities. In the preface, he promises a continuation of the work, which he probably did not finish. He died in 1579. Douglas. Bibliog. Haller. Bib. Anat.

CANAPÉ, JOHN, physician to Francis I., in 1542, and public reader in surgery to the barbers surgeons company at Lyons, published in 1538, "*Le Guidon pour les Barbiers, et les Chirurgiens*," 12mo. Lyons. It was much esteemed in its time, and was several times reprinted. *L'Anatomie des os du corps humain*, de Gelian, 1541, Lyons. He also translated two of the books of Galen on simple medicines, and published a collection of treatises, on different branches of medicine, 1552. Eloy. Dict. Hist. Haller. Bib. Anat.

CANAPLES, in *Geography*, a town of France, in the department of the Somme; 10 miles N. of Amiens.

CANARA, a country of Hindoostan, belonging to the kingdom of Mysore, about 60 leagues in length along the coast of the Indian Sea, and from 10 to 30 broad. Its principal places are Mangalore, Barcelore, Onore, and Carwar, which see respectively. This district is one of the acquisitions gained from Tippoo Sultan in 1799. Canara has a peculiar dialect, which extends as far as Goa.

CANAR-ATAN, or *Great Canar*, a village dependent on the city of Cuenca, under the jurisdiction of the province of Quito, in Peru. It is remarkable for the riches contained in the adjacent mountains.

CANARD, in *Ornithology*, among the French, has the same application as duck with us, and anas amongst Latin writers: vide Buffon, and others. In the common phraseology of France, it literally implies the domesticated duck.

CANARDER, Fr. is a term of reproach, when applied to a hautbois player; implying, when his reed fails, that he quacks and cackles like a duck.

CANARDER, in *Military Language*, denotes to shoot, fire, discharge, or throw any thing at or on an enemy with advantage, or from a covered, secure, and advantageous situation, as out of a small turret, guerite, or centry-box, from behind a hedge, dike, or fence, between pickets or palisades, from walls with embrasures or loop-holes, &c.

CANARDIERE, a small turret, guerite, or centry-box, sometimes made of wood, and sometimes of stone. Such boxes, or guerites, are occasionally erected or placed at the salient angles of works as places of shelter for sentinels, and for them to see from under cover. They used formerly to be constructed on castles for people to shoot, fire, discharge, or throw any thing from, unseen, in unmo-lested security.

CANARIA, in *Ancient Geography*. See CANARY.

CANARIA, in *Ornithology*, a species of FRINGILLA, familiar to every one by the title of *Canary finch*, or *Canary bird*. The species is thus defined: bill and body yellowish white, with the quill and tail feathers greenish. Linn. Fn. Suec. &c.

The canary bird in a state of nature is of a plain grey colour, with the down at the base of the feathers black, or

blackish; the tail is somewhat forked, and the legs pale. They inhabit chiefly the Canary islands, but are also found in other contiguous places. Forster observed them at Cape Verd, Fayal, and Madeira, where they are said to frequent watery places, abounding most among the sedges on the banks of rivulets.

M. Adanson remarks that the canary bird, which becomes white in France, is at Teneriffe almost as grey as a linnet; a change he supposes to arise from the coldness of the climate. The colour is also susceptible of considerable variation from the diversity of its food, from captivity, and especially from the intermixtures with other species. So early as the commencement of the last century, Buffon observes, that bird-fanciers reckoned in the single species of canary bird no less than nine and twenty varieties, every one of which was so distinct from each other as to be easily pointed out.

It may not prove altogether uninteresting in this place to enumerate the principal varieties of this fancy-bird in the natural order through which they may be traced, beginning with those which approach nearest to the primitive species.

Common canary finch, of a grey colour with the down black, as in the wild bird found in the Canary islands.

Grey canary finch, with the down and feet white.

Grey canary finch, with white tail.

Common flaxen canary finch.

Flaxen canary finch, with red eyes.

Flaxen canary finch, with plumage glossed with a golden hue.

Flaxen canary finch, with the down fair, or unmixed with black.

Flaxen canary finch, with white tail.

Common yellow canary finch.

Yellow canary finch, with the down yellow and unmixed with black.

Yellow canary finch, with a white tail.

Common agate coloured canary finch.

Agate coloured canary finch, with red eyes.

Agate coloured canary finch, with white tail.

Agate coloured canary finch, with the down of the same colour.

Common yellow-dun coloured canary finch.

Yellow-dun coloured canary finch, with red eyes.

Yellow-dun coloured canary finch, with plumage glossed with a golden hue.

Yellow-dun coloured canary finch, with down of the same colour.

White canary finch, with red eyes.

Common variegated or spangled canary finch.

Variegated canary finch with red eyes.

Canary finch, variegated with fair or flaxen colour.

Canary finch, variegated with flaxen colour, and having red eyes.

Canary finch, variegated with black.

Canary finch, variegated with black and fine yellow, and having red eyes.

Canary finch, regularly spangled with black and fine yellow. Crested canary finch.

Canary finch entirely of a full yellow.

Canary finch of a yellow colour, mixed with brownish grey or greenish; which last, Dr. Latham observes, he has frequently seen in Chinese drawings, but whether they were caged birds or not he was unable to ascertain.

The above-mentioned kinds of canary birds are again subdivided into an amazing number of varieties, some of which are remarkable for beauty, and others are no less esteemed for rarity, or melody of song. All these may, however, be comprehended under two general heads, the variegated kinds, and those with the plumage plain; or, as it seems they are denominated in London by bird-fanciers, the *span-gled*

gled and the gay birds. Writers observe that the white canary finches are never variegated, neither are the citron coloured; but when the latter have attained the age of four or five years, the extremities of the wings and tail become white. The grey are not of an uniform colour, for there are feathers more or less grey intermixed in their plumage, and in many of those birds the grey is lighter or darker, and more or less inclining to brown or black. The agates are of an uniform colour in general, but liable to vary in the intensity of their hues. Those inclining to a cream colour are still more uniform; the yellow is constant both in the same bird, and in different individuals. In the variegated or spangled birds those that are of a jonquil yellow are tinged with black, and there is generally a spot of black on the head. There are variegated individuals with all the simple colours above-mentioned, but those of the jonquil colour are such as are more commonly variegated with black.

These varieties are not the spontaneous offspring of the common canary finch; but of that bird crossed with the *Venturon*, and *Cini*, or *Serin*, two species very nearly allied to the canary finch, and both which inhabit the south of Europe. It is by this means, as well as by pairing the canary finch with the goldfinch, linnet, yellow-hammer, chaffinch, and even the domestic sparrow, that so many varieties are produced. The canary bird proves fertile with the siskin and goldfinch, but in this case the produce for the most part proves sterile: the pairs succeed best when the hen bird is the canary, and the cock is of the opposite species. Indeed it has been remarked that the male canary bird will not assimilate with the females of any of the before-mentioned species, and that the cross breed can only be procured by means of the hen canary. The two birds with which the canary intermingles its breed the best, as already stated, are the *Serin*, or *Fringilla Serinus*, and *Venturon* or *Citril*, *Fringilla Citrinella*. The *Serin* is a bird of small size, being rather less than the common linnet. Its upper mandible is brown, the under, whitish: the plumage above, brown, mixed with yellowish green; beneath, greenish yellow, and having the sides marked with longitudinal spots of brown: the wings are marked with a greenish band: quills and tail brown, edged with greenish grey, and the legs brown. This kind is found not only in Italy, but in Greece, in Turkey, Austria, Provence, Languedoc, Catalonia, and probably in all the climates of that temperature. There are, however, certain years in which it is very rare, even in the southern provinces of France. Its song is agreeable and varied, but the song of the female is inferior to that of the male. The citril finch is larger than the venturon, and has a louder note; it is indeed remarkable for the brightness of its colour, and for the strength and variety of song. The female is somewhat larger than the male, has less of the yellow in its plumage, and does not sing so well, or rather answers him, as it were, by monosyllables. It is found in Provence, Dauphiny, Geneva, Switzerland, Germany, Italy, and Spain. In Burgundy it is known by the name of the canary. The plumage on the upper parts is of a yellowish green, spotted, or variegated with brown; beneath greenish yellow: wings dusky and greenish, and the legs flesh colour. We conceive it right to be thus particular in pointing out the characters of the two latter birds, since they have been most commonly confounded as varieties of the canary finch, which alone is found in the Canary islands; and from which they differ specifically, although in general appearance and manners of life they nearly assimilate. It is with those two primitive species that the canary bird is commonly crossed with most success, and from the union of which many of the more esteemed varieties of the common canary bird are produced. They are reared chiefly by the Germans and Italians, both

of whom are celebrated for their skill in improving the natural notes of the canary bird by tuition. Most of the canary birds, we are told, that are imported from the Tyrol, have been brought up by parents, the progenitors of which were instructed by the nightingale. Our English canary birds have commonly more of the tit-lark note. The principal place for breeding canary birds is Inspruck and its environs, from whence they are sent to the Levant, and every part of Europe.

Canary birds are bred in large quantities, both for sale and amusement, in England, as well as in Germany, France, and other countries; and in each of these countries they have, by bestowing due attention to the subject, very much improved the breed beyond those imported from the Canaries. They are of different colours, yellow, white, buff, grey, and green, with an endless variety of combinations arising from the different shades of colour in the parent birds. Those brought from Germany are generally variegated, or mottled, and are the least valued, because the heat of the stoves, generally used to warm the houses in that country, renders the birds bred there tender and short-lived; German birds seldom living above two or three years in this country: whereas the canary birds bred in England in the usual way are said to live eight or ten years. Olina tells us they commonly live 10 or 15 years; Salerne says 18, and we have known individuals that have survived for a still longer term of years.

The cock of the German kind is highly valued for its singing, having a very sweet note, which it continues for some time in one breath without intermission; and raises higher and higher by degrees, with great variety. In this bird the fore part of the head, the throat, the pinion of the wing, and the rump, in the cock bird, are of a brighter yellow than in the hen, which mark will hold good in all the canary birds, of whatever kind they may be. The cock is also bigger than the hen, his carriage more sprightly and majestic, and he is observed frequently to extend his neck and head in a very brisk and lively manner. The hens sing indifferently, inasmuch indeed as scarcely to deserve the name of singing. Whenever the cock sings, his throat may be seen to swell, and play all the while he is warbling, but in the hen there is no such motion. The Hon. Daines Barrington has written an elaborate treatise upon the notes of singing birds, in which those of the canary bird are treated upon at some length, and which may be consulted with much satisfaction by the curious reader. Vide *Phil. Trans.* v. 63. See *SONG of birds*.

Among a variety of other sorts, there are two kinds of canary birds in particular that are much esteemed among breeders; namely, those birds which are all yellow, and those which are mottled and have a yellow crown; the former, in the breeding style, being called gay birds, and the latter spangled, or fancy birds. The fancy breed are esteemed the strongest, and have the boldest song. Careless breeders often match a gay with a fancy bird, and then the produce, partaking of both kinds, are called mules, being foul irregular birds, and of no value for feather, though they may prove as good as any for singing. If you propose to breed gay birds, choose the cock and hen of a clear uniform yellow colour, without being spotted with foul feathers; for these indicate that the breed has some time before been crossed. There are several subscription societies in London, which raise annual premiums for those who rear the finest birds, and who have a pattern bird painted, or engraven and coloured, as a standard of perfection, with his various characters explained in technical terms. The principal test of a good fancy bird consists in his having a clean cap, i. e. the crown of his head defined by a horizontal line at the level of his eyes, and beak, is to be of a clean yellow or white, without being broke or spotted

spotted with foul feathers, as a single feather of this description is considered as a drawback from his perfection, though this degree of perfection is seldom found. Add to this, that his back, wings, and tail ought to be as clear from yellow or white feathers. The finer he is mottled on the back, and clearer yellow he is on the belly, the handsomer he will be esteemed. These general characters are equally requisite in the hen as in the cock, besides which there is a casual variety in fancy birds, distinguished either as mealies or junks; the mealy birds being those whose crown and bellies are of a clean white or pale yellow, and the junks such as have their crown, and belly of a deep yellow. The fine spangled sort, commonly called French canary birds, and the mealy ones, are the best to breed with for those who are very curious; because a spangled cock with a mealy hen will produce a more regular spangled feather than if the cock and hen were both spangled, as they would then breed too high upon the yellow.

When individuals of an uniform colour are paired together, their young are of the same colour; a cock and hen that are grey generally produce grey birds; but if a male grey is put to a female white, or male white to a female grey, the brood will be more beautiful than the parents; and as the numbers that may be crossed by such combinations are inexhaustible, we can at all times produce varieties in shade and tint, that have not appeared before. The mixtures that may be made of the spangled birds with those of an uniform colour increase still more the number of combinations that may be produced; and thus varieties in the species may be multiplied without end. It likewise often happens, that without the assistance of fancy birds, we have pretty little variegated birds which owe their beauty to the mixture of different colours in their parents or progenitors, some of which either by their father or mother's side may have been variegated.

With regard to the mixture of other species with the canary bird, the following observations have been collected. The birds that come from the junction of the citril, the fiskin, and the goldfinch, with a hen canary bird, are generally stronger than those from a cock and hen canary bird. They sing longer; and their voice is more sonorous and strong, but they are taught with difficulty; the greater part always whistle imperfectly, and it is seldom one can be found that is able to repeat a single air correctly, or without missing.

When we wish to procure birds from a mixture of the goldfinch with a hen canary bird, the former must be two years old, and the latter one; because the canary bird comes sooner to maturity than the goldfinch, and in general they succeed best when they have been bred up together. But this is not absolutely necessary; neither will the hen that has formerly hatched with a cock of its own species always refuse the male of another species, as father Bougot had an opportunity of ascertaining. "I happened (says Bougot) to put four male canary birds to eight females of the same species; some bad seeds poisoned three of the males, and all the females lost their first eggs: I resolved to substitute three male goldfinches taken in a trap in place of the three dead canaries, and I put them into the cage about the beginning of May. Towards the end of July I had two nests of mongrels, which succeeded to admiration; and the following year I had three broods with each goldfinch and hen canary bird. These last in general do not breed with the goldfinch till they are from a year to four years old, and seldom after, while with their own species they continue to hatch for nine or ten years. The common variegated female alone will breed with the goldfinch beyond her fourth year. A goldfinch must never be let loose in an aviary, for he destroys the nest and breaks the eggs of the other birds." Hence we perceive that the hen canary birds, although accustomed to the males of their

own species, will yield to the caresses of the goldfinch, and will breed with these birds successfully. Their union with these is even as fruitful as with their own natural males, since they lay three times in the year with the goldfinch. It is not so in the union of the male linnet with the hen canary bird; there being in that case only one brood, or very seldom two in the course of the year.

The bastard birds, which proceed from the canary, and the fiskin, goldfinch, and some others, are by no means sterile, but mongrels that can pair and propagate, not only with the goldfinches or the canary birds indiscriminately, but also among themselves, and produce offspring that can pair and perpetuate their varieties. But it must be owned that the produce of these mongrels is not so certain nor so numerous by any means as in the pure or unmingled species: they seldom hatch more than once in a year, and often lay eggs that are addled. Their successful production depends on many little circumstances that cannot be discovered, far less pointed out. It is said, that among the crosses breeds there are always many more males than females. A female canary bird and a goldfinch, paired by Bougot, produced, in the same year, at three hatchings, nineteen eggs that were all fertile; among which there were only three females, the remaining sixteen being all males. When a person wishes to pair the canary bird with the goldfinch, it will be best to take young goldfinches of ten or twelve days old from the nest, and put them into a nest with canaries of the same age. He should feed them together, and leave them in the same cage, accustoming the goldfinch to the same food as the canary bird. It is usual to put a cock goldfinch to a hen canary bird, as they pair more easily, and prosper better than the cock canary bird and hen goldfinch. It must, however, be observed, that the brood in the first case is later, because the cock goldfinch does not pair so quickly as the cock canary. But when the female goldfinch is put to a male canary bird, the pairing takes place much sooner. To succeed, a male canary bird is never to be put into a cage where there are females of its own species, for then he will prefer these to female goldfinches.

The union of the male canary with the female fiskin prospers exceedingly well. A female fiskin, confined in an aviary for nine years, was known to have for the first five years three broods annually, and for the remainder of the time two broods a year, all of which prospered. Linnets and canary birds have been put together, but they seldom breed unless the cock linnet be put with the hen canary bird; the female linnet will not even make a nest, but drops a few eggs in the cage, which are generally addled, so that it is needless almost to compel the hen to sit upon them. The chaffinch and yellow hammer are, with great difficulty, made to pair with the canary bird. A female yellow hammer has been left with a male canary for three years, during all which time the female laid only addled eggs; and it is just so with the female chaffinch, but the cock chaffinch and yellow hammer with the hen canary bird have produced some fertile eggs.

It follows from hence, and various other facts, that the fiskin alone will breed with the canary bird equally well, whether male or female; the hen canary bird produces likewise easily enough with the male goldfinch; not quite so easily with the male linnet; and lastly, that it will breed, though more reluctantly, with the males of the chaffinch, the yellow hammer, and sparrow, while the male canary is incapable of fecundating the females of any of the last, or at least that the latter very rarely succeeds when paired with them.

The dispositions of canary birds are extremely variable. There are some cocks that are always melancholy, and even sullen, singing seldom, and then in a dismal strain; they are long in learning, and learn at last, but imperfectly, what you

reach them, and that little which they acquire they very soon forget. They are often so uncleanly, that their feet and tail are constantly dirty; and they do not please the female, whom they never regale with their song, not even when their young first appear. There are others so wicked that they will kill the hen they are put to, and the only way to tame them is to give them two females, who join for their common defence, and when they have once vanquished by force, the male becomes tamer, and they ensure their conquest afterwards by tenderness and love. Some of the males are so ferocious as to break and eat the eggs when the hen has laid them; or, if this unnatural father allows her to hatch them, the young are scarcely excluded from the shell of the egg, than he seizes them with his bill, drags them from the nest, and kills them. Others are so wild and ungovernable, that they will neither allow themselves to be touched nor caressed; they must be left at liberty, and cannot be treated like the others: if they are meddled with in the least they will not breed; their eggs must not be touched, nor taken away; and they will not hatch if they are not suffered to pair or build as they please. And lastly, there are some of an indolent disposition; such, for example, are the grey ones; these never build, and the person that attends them must make a nest for them. All these tempers are very distinct, and very different from favourite canary birds that are well-tutored: these are always gay, always singing, agreeable, of a happy disposition, and endowed with the best inclinations.

The bad disposition of the canaries frequently proceeds from mismanagement. When they break their eggs and kill their nestlings, they are oftentimes governed by the impulse of impetuous love, and it is to enjoy the female that the male drives her from the nest and destroys the tender objects of her affection. Accordingly, the best means of making such birds hatch is not to put them into different cages. It is better to place them in a room well exposed to the sun; and to the east in winter, where there are many hens and only few cocks, for then they will enjoy themselves more, and multiply better. When a hen sits, the cock finds himself another mate, and does not disturb her. Besides, the cocks have many quarrels among themselves from jealousy; and when they see any one so ardent as to torment the female and attempt to break the eggs, they beat him so severely as to punish him effectually for his temerity.

When the canaries are about to build, they should be furnished with lint, or shreds of linnen, hair of oxen, moss, and very small and dry straw. Goldfinches and siskins, if put with hen canary birds, when male birds are wanted, prefer small straw and moss, but the canary birds like hair and lint: these should be cut very small, for fear the threads should entangle the feet of the hen, and cause her to pull the eggs from the nest as she rises from it.

For feeding them, you must place in the room a hopper, pierced all round so as to admit their heads, filled with a portion of the following composition: three quarts of rape-seed, two of oats, two of millet, and two of hemp-seed. Every twelve or fourteen days the hopper is to be filled, taking care that the seeds are clean and well winnowed. This food is proper as long as they have only eggs; but the evening before the young are excluded, they must have a dry cake kneaded without salt, which may be left till it be eaten, and then you may give them eggs boiled hard; a single hard egg, if there are but two cocks and two hens, or more, in proportion to the number of birds. They must have no vegetables while breeding, as that would weaken the young too much; but, in order to vary their food a little, give them every third day, on a plate instead of the

dry cake, a piece of white bread dipped in water, and pressed with the hand; this bread not being such substantial food as the cake will prevent them from growing too fat when hatching. It will likewise be proper to give at the same time some poppy seeds, but only once in two days, for fear of heating them too much: sugar biscuits generally produce this effect, which is followed by another still more hurtful; for when they are fed on biscuit they often lay added eggs, or bring weak and sickly young. While they have young, it is recommended to boil their rape seed, to deprive it of its acrimony.

After the eggs are laid, give the canary birds plantain and lettuce seed to purge them. The food of the nestlings, when hatched, must be prepared: it should be a paste composed of boiled rape seed, a yolk of an egg, and crumb of the cake mixed, and kneaded with a little water, which is to be given to them every two hours. This paste must not be too liquid, and, for fear of its turning sour and injuring the birds, it should be renewed every day till the young can feed themselves.

Canary birds are distinguished by different names, according to their age. Such as are about three years old, are called *runts*; those above two, are named *eriffs*: those of the first year, under the care of the old ones, are called *branchers*: those which are new flown, and cannot feed themselves, *puffers*; and such as are brought up by hand, *nestlings*.

The brood of birds in a state of captivity is not so constant, but is, perhaps, more numerous than it would probably be in a state of native freedom; for there are hens who will hatch four, or even five times a year, laying four, five, or six, and sometimes even seven eggs at a time; in general, they have three broods, and the moulting prevents their having more. There are hens, however, that hatch while they moult, provided they begin to sit before that time. Birds of the same nest do not all begin to moult at the same time. The weakest are the first to undergo that change; the strongest are often a month later. The moulting of jonquil canary birds is more tedious, and generally more fatal than that of the others. The hens of these jonquil birds lay only three times, with three eggs each time; the light-coloured ones, both cock and hen, are too delicate, and their brood seldom prospers. The cream-coloured have some repugnance to pairing with one another, and in a large aviary it almost constantly happens, that a cream-coloured male will make choice of a female entirely of another colour. In general the white ones, however, pair, build, and hatch together, and commonly succeed better than when a white one is paired with another of a different colour.

Notwithstanding the difference in the disposition, temperature, and fertility of these birds, the time of incubation is the same in all. They uniformly sit thirteen days, and when it happens a day less or more, it is owing to some accidental circumstance; cold retards the exclusion of the young, and heat accelerates it. Accordingly, it happens sometimes, that the first sitting in April lasts thirteen days and an half, or fourteen days, if the air is at that time cold; on the contrary, the third hatching, which happens during the great heats of July or August, lasts only twelve days and a half. The bad eggs ought to be separated from the good; but in order to know them certainly, you should wait till they have been sat upon for eight or nine days, then take each egg by the two ends for fear of breaking them, and hold them against the sun, or a lighted candle; those which appear clear are to be rejected as it would only fatigue the hen to no purpose to leave them in the nest. In thus separating the clear eggs from the complement of three nests, we may select only sufficient to make up two of

them; and the third hen being released from sitting, will proceed to lay again. It is a practice much recommended by bird-fanciers, to take away the eggs as the hen lays them, substituting an ivory one in the place of each, that the whole may be hatched together. When the last egg is laid, the ivory ones are removed, and the others replaced. In general, the time of laying is in the morning, about six or seven o'clock; it is said, when this happens an hour later, it is owing to the hen's being sick; the eggs being thus laid in regular succession, it is easy to take them away the moment they are laid. However this practice is more adapted to our own convenience than to that of the bird, and is contrary to the economy of nature: it causes the mother to part with a great deal of heat unnecessarily, and burdens her at once with five or six young which incommode her more than they give her pleasure, while when she sees them come successively one after the other, her pleasures are multiplied, and her strength and courage supported; accordingly, some very intelligent bird-fanciers assert, that the natural way has always succeeded better than the above-mentioned practice.

In their native country, canary birds haunt the banks of little rivulets and other watery places; we should not, therefore, suffer them to want water, either to drink or bathe in. As they are natives of a very mild climate, they must be defended from the rigour of winter, although from long habit, they are now so far naturalized to our climate, as to live very well during the winter in a room without fire: some breeders accustom them even to live all the winter in a room with the window or windows open, and only guarded with a net-work to prevent their escape.

It is seldom that canary birds brought up in a chamber fall sick before hatching; sometimes a few cocks will over-eat themselves and die; if the hen grows sick while she is sitting, her eggs must be taken away and given to another; for though she should get better soon, she will not return to her nest. The first symptom of sickness, especially in the cock, is melancholy; whenever he is observed to lose his natural gaiety, he must be put in a separate cage, and placed in the sun in the same room with the hen. If his feathers appear rough, you must look if he has not a pimple on the rump; this the bird sometimes opens with his bill, but if not, it should be pricked with a large needle, and the wound anointed with saliva, without mixing any salt with it, which would smart it too much. The most general cause of sickness is too abundant, or too rich food; when these birds are made to breed in a cage or closet, they often eat too much, or select the succulent food intended for the young, and hence arise the ill effects of repletion, or inflammation. By keeping them in a room, this may be in a great measure prevented; because, being among a great number, they hinder one another from eating to excess. A cock who eats for a long time is sure to be beaten by the other males; and the same is the case with the hens; these quarrels give them exercise, temperance, and occupation; and it is chiefly on this account that they are seldom or never sickly in a chamber during the breeding time; it is only after hatching that infirmities and diseases attack them. The greater part of them become afflicted with the pimple before mentioned, and afterwards all of them are subject to moulting. Some support this change of state extremely well, and do not fail to sing a short time every day, but most of them lose their voice, and some even die. When the hens have attained the age of six or seven years, they moult with difficulty, and many of them die. Young canary birds moult early

in the year: about six weeks after they are hatched they become melancholy, appear rough, and put their head under the wing. Their down falls in this first moulting, and in the second, the following year, the large feathers, including even those of the wings and tail, fall off. Cold weather is unfavourable to the canaries while moulting, and they would all die at this time, were they not kept in a temperate, or rather in a warm place. The usual time of moulting is about six weeks or two months.

The most fatal, and common disease that the young canary birds are subject to, is what is called the surfeit, in which their bowels seem to descend to the extremity of the body. The intestines are seen through the skin in a state of inflammation, redness, and distention; the feathers on that part fall off, the bird grows emaciated, gives over eating, though he sits by his meat, and dies in a few days. The cause of this disease is the too great quantity, or succulent quality of the food. All medicines are fruitless; diet alone can save a few out of a number of birds thus affected. They must be put into separate cages, and nothing given to them but water, and lettuce-feed; this food is cooling and purgative, it tempers the ardour that consumes them, and sometimes occasions evacuations that save their lives. In short, we may observe, that this disease proceeds solely from our method of rearing these birds. We ought, therefore, to be particularly cautious of over-feeding them, when we bring them up: boiled rape-feed, a little groundsel without fugar, or biscuit, and in general rather too little than too much food is to be recommended.

When the canary bird utters a faint and frequent cry, which seems to issue from the bottom of his stomach, he is said to be asthmatic; he is also subject to a sort of extinction of the voice, especially after moulting. The asthma is cured by administering plantain seed, and hard biscuit soaked in white wine, and the voice may be restored by giving him for food the yolk of eggs mixed with crumbs of bread, and for his drink, water in which liquorice root has been sliced and steeped, or if boiled in it, so much the better. Canary birds are likewise affected with ulcers in the mouth, which are supposed to proceed from a superabundance of succulent food, as in the former cases: these ulcers commonly occasion an inflammation in the throat, and palate, which can only be cured by administering a cooling diet, and for this purpose nothing can be better than lettuce-feed, with a few seeds of the melon bruised, and infused together in water. The imposthume is another disorder to which the canary birds are liable: the most approved medicine for this disorder, we are told, is to anoint the top of the head for two or three days with an ointment made of fresh butter and capon's grease melted together. After anointing the head three or four times, it should be examined, to see whether the part of his head affected be soft; and if so, open it gently and let out the matter, which will be like the yolk of an egg. When this is done, anoint the wound, and the bird will soon be cured. Unless this precaution be taken, the canary birds afflicted with this disorder are very apt to fall down suddenly and expire.

These birds are also infested with a peculiar sort of louse, and scab, owing to the slovenly manner in which they are kept by some people. Care should be therefore taken to have them always clean, to give them water to bathe in occasionally, to be choice in their food, and never to put them into cages of old wood. Those cages it has been recommended, to have made either of walnut-tree, or oak with bars of wire. Cages of the usual cylindrical form are objected to as being improper, since they allow the birds very

little room to walk in, and without this exercise they become melancholy, or at least, lose a considerable share of their natural vivacity: the cages that are constructed of a lengthened form, high, and narrow, are the best adapted to the purpose of breeding and rearing this beautiful song-bird, when the breeder cannot devote a room to that object alone.

CANARIENVOGEL, according to Frisch the canary bird *Fringilla canaria*.

CANARIE, Fr. a quick dance in jig time. The word is twice used by Shakespeare,—“*Canary to it with your feet.*”—*Love's Labour lost.*—“*And make you dance canary with spritely fire and motion.*”—*Al's Well.*

Merfenne gives a specimen of the kind of movement. He says the cabriolles are rapid, and the figure extremely difficult.



Purell has canaries in his musick to Dioclesian. The tune is said to come originally from the *Canary* islands.

CANARI, in *Ancient Geography*, a people of Africa, who inhabited the district towards the south-east of Mount Atlas. Pliny mentions them, and says, that they eat the flesh of dogs.

CANARINA, in *Botany*. Linn. Mant. 225. Schreb. 603. Willd. 689. Juss. p. 164. Vent. vol. 2. p. 470. Class and order. *Hexandria monogynia*. Nat. Ord. *Campanaceae*, Linn. *Campanulaceae*, Juss. Gen. Ch. *Cal.* Perianth superior, fix-cleft, permanent; segments lanceolate, recurved. *Cor.* monopetalous, bell-shaped, fix-cleft, nerved; nectary of six valves, equal, covering the receptacle, distant. *Stam.* Filaments six, awl-shaped, spreading outwards, originating from the valves; anthers pendulous from the tip. *Pist.* Germ inferior, hexagonal; style conical, short; stigma longer than the stamens, club-shaped, fix-cleft. *Peric.* Capsule fix-angled, obtuse, fix-celled. *Seeds* numerous, small. Eff. Ch. Calyx fix-cleft, corolla fix-cleft, bell shaped, stigma, fix-cleft.

It differs from *Campanula* only in number; a difference which, if allowed to be a sufficient generic distinction, will banish many species from the genera in which they have been very naturally placed, and have long quietly stood. Linn. Mant. 225. Willd. Mart. Lam. Ill. Pl. 259. Bot. Mag. 144. Sp. 1. *C. campanula*, (*C. canariensis*, Linn. Sp. Pl. 29. Tourn. 109. Pluk. Alm. tab. 276. fig. 1.) “*Stem* erect; leaves halbert-shaped, in threes or opposite.” *Root* perennial, spindle-shaped. *Stem* three feet high herbaceous, erect, rather feeble, round, even, knotty, branched; branches two or three from each knot; upper ones longer, dichotomous at the end; little branches alternate. *Leaves* on the stem by threes, on the branches opposite, petioled, unequally toothed, even, veined. *Flowers* from the forks of the upper branches large, peduncled, drooping; corolla reddish-yellow, or orange, brighter at the bottom, with a yellow eye; each segment marked with three purple branched nerves; anthers yellow. A native of the Canary islands, whence the genus, though not very properly, has derived its name. 2. *C. Zanguebar*, Lour. Cochin. 195. “*Stem* climbing: leaves halbert-shaped alternate.” *Stem* shrubby, round, even, branched. *Leaves* heart-halbert-shaped, quite entire, smooth, veined, petioled. *Flowers* solitary, lateral: corolla pale-co-

loured. *Capsule* somewhat egg-shaped, sharp at the base, fix-nerved, opening at the base, seeds heart-shaped, compressed, surrounded by a turbinate ring, odorous. A native of Zanguebar on the coast of Africa.

Propagation and Culture. The first species only has been cultivated in Europe. It is propagated by parting the roots, which should be done in July, soon after the stalks are decayed. It succeeds best in a light sandy loam, with a fourth part of screened lime-rubbish. The pots should at first be placed in the shade, and unless the season be very dry, should not be watered. About the middle of August they should be placed under the hot-bed frame, and as the nights grow cool, covered with the glasses. When the stalks appear, the plants should be sometimes, but not often, refreshed with a small quantity of water. About the middle of September they should be removed into a dry airy glass-case, where they may enjoy the free air in fine weather, and yet be screened from cold. They flower from January to March, when they should be frequently watered. In spring, when the stalks begin to decay, the pots should be set abroad in the shade and not watered. Miller.

CANARIUM, from *canis*, dog, in *Antiquity*, a Roman sacrifice, wherein dogs of a red and ruddy colour were sacrificed, for a security of the fruits of the earth against the raging heats and disorders of Sirius in the dog-days.

CANARIUM, in *Botany*, (from its vernacular name *Canari*, in the Malay language) Linn. Mant. 127. Schreb. 1516. Juss. 370. Gært. 605. Class and Order. *Diccia pentandria*. Nat. Ord. *Terebintaceae*, Juss.

Gen. Ch. Male. *Cal.* Perianth two leaved: leaves egg-shaped, concave, permanent. *Cor.* Petals three, oblong, resembling the leaves of the calyx. *Stam.* Filaments five, very short; anthers oblong, the length of the petals.

Female. *Cal.* as in the male: leaves reflexed. *Cor.* as in the male. *Pist.* germ egg-shaped: style scarcely any: stigma capitate, triangular. *Peric.* Drupe dry, egg-shaped, acuminate, surrounded at the base with a scolloped membrane. *Seed.* Nut egg-shaped, triangular, acute.

Eff. Ch. Calyx two-leaved. Corolla tripetalous. Stigma nearly sessile. Drupe with a triangular nut.

Sp. 1. *C. commune*. Linn. Mant. 127. (*C. vulgare* Rumph. Amb. 2. p. 145. Tab. 47.) β. *C. Mehembethene*. Gært. tab. 102. fig. 1. A resinous lofty tree. *Trunk* covered with a whitish bark; wood whitish, tolerably solid, but not durable. *Leaves* alternate, unequally winged; common petioles striated; leaflets nine, large, petioled, oblong egg-shaped, acuminate, even. *Flowers* whitish, sessile, stiff, divaricated panicles, which terminate the branches. Gærtner asserts that the commune of Linnæus, and the mehembethene are mere varieties of the same species. He has figured the fruit of mehembethene, and given the following description. *Drupe* superior, berried, acuminate-egg-shaped; skin olive-coloured, thin; pulp small in quantity, full of capillary fibres: shell bony, egg-shaped, either slightly pitted or even, trigonous, three celled, with three obtuse teeth at the tip, marked with three obscure raised lines on the sides, and perforated through its whole length with a thread-shaped axillary canal. *Seeds* oblong-egg-shaped, two in each cell, only one of which comes to maturity. The drupe of the other variety is a little larger, and the pulp without fibres. The shell is more sharply triangular, and its sides are perfectly smooth, nearly flat, without the middle raised line. The fertile cell and seed are also larger. In the oldest seeds Gærtner never found the kernel rancid, but always sweet, with a flavour resembling that of fresh almonds which, as he observes, is the more remarkable, because the cotyledons, when the integument of the seed is stripped off, seem besmeared with oil, are very slippery, and repel water.

A native of the Molucca Isles and New Guinea. The nuts are eaten by the natives either raw, or made into a kind of bread. An oil is also expressed from them which is used at the table. When eaten fresh they are said by Rumphius to bring on dysenteries, and to occasion an oppression of the breast. 2. *C. sylvestre*, or Nanarium. Rumph. amb. 2. tab. 49. Gært. tab. 102, fig. 3. *Drupe* fleshy, inversely egg-shaped, round, not trigonous as in the preceding; shell egg-shaped, stony, very thick, obscurely trigonous, marked with three depressed longitudinal lines, to which as many small callous tubercles are joined below the top of the shell; cells three, two of which are often abortive, the third very irregular, and lined with a very smooth cartilaginous crust. *Seed* oblong, trigonous, curved in the form of the letter S, gibbous in contrary directions near each end. The kernel, on account of its singular form and brittleness, cannot be got out entire, unless the shell be opened carefully from one end to the other. 3. *C. decumanum*, Rumph. tab. 55. Gært. tab. 102, fig. 2. *Drupe* the largest of any in the genus; shell oblong-egg-shaped, triangular, stony, thick, with six teeth at the tip; angles prominent, smooth, longitudinally furrowed; sides pitted with numerous oblong depressions as if they had been eaten by worms; axillary canal triangular; cells three, large. *Seeds* wanting in the specimen examined by Gærtner. Professor Martin has represented the last two also as only varieties of *C. commune*: but it is evident, from Gærtner's descriptions and references to Rumphius, that he judged them to be distinct species.

Loureiro calls this genus *Pimelea*, on account of its oily produce, but that name has been given for a similar reason to a very different set of plants, natives of New Holland and New Zealand. See *PIMELEA*. Loureiro has added to the *C. commune* of Linnæus, which he calls *Pimelea alba*, two other species which he found in Cochinchina and its neighbourhood. 4. *C. nigrum*. Leaves winged; flowers in lateral racemes: nuts two-celled. An oil is extracted from its kernel, not less agreeable than that of the olive, but heavier on the stomach. 5. *C. oleiferum*. Rumph. vol. i. tab. 54. Leaves pinnated with four pair of leaflets; peduncles lateral, many-flowered; nut one-celled. The drupes are eaten like those of the first species; an oil for the table is likewise procured from them. When the bark is wounded, there exudes a yellowish, odorous, oily resin, similar to copal, which is used to varnish household furniture. The substance called Damar or Dammar in the East Indies, and used for the calking of ships, is composed of this resin, mixed with the bark of the bamboo reduced to powder, and a little chalk. It is preferable to all other substances for this purpose with respect both to its durability and tenacity, and has not the smell of European pitch. Bosc. in Nouv. Dict. The trivial name given by Loureiro to the last species is a bad one, not being at all discriminative.

CANARIUM, in *Conchology*, a species of *STROMBUS*, found in the seas and great rivers in the southern parts of Asia. This shell is somewhat heart-shaped, with the lip round, short, refuse, and with the spire smooth. Linn. &c. Length two inches and a half; colour yellow, or brown, with transverse fuscous angulated lines; pillar snowy white. The general contour of the shell remarkably ventricose.

CANARIUM of Rumphius is the species of *STROMBUS* described by Linnæus under the name of *GIBBERULUS*. CANARIUM is also the name given by Rumphius to the Linnæan *STROMBUS URCEUS*, which see.

CANARY, in *Geography*, a town of Poland, in the palatinate of Sandomirz; 16 miles W. of Sandomirz.

CANARY, *Grand*, still known by the name *Canaria*, given to it by Pliny and Ptolemy; one of the Canary islands, from which the general appellation is derived; situate be-

tween Teneriffe on the west, and Forteventura on the east, about 100 miles N.W. from Cape Bojador on the African coast. N. lat. about 27°. W. long. 15°.

This island is about 100 miles in circumference, and the number of inhabitants amounts to 40,000. Pliny says, that it formerly produced a sort of dates, and pine-apples in great abundance. The soil, though light and sandy, is covered with a rich mould, which produces two harvests in the year. The wheat and other corn are reckoned very good; sugar canes are much cultivated; the vines yield those grapes from which is made the wine called sack, or canary; and the island abounds with excellent fruits, such as apples, pears, melons, figs, peaches of several kinds, and plantains. It has also plenty of horned cattle, stags, poultry, pigeons, and partridges. Wood is scarce. Filtering-stones constitute an article of traffic from this island, as well as from Forteventura. The capital of the island, and also of the Canary islands, is Palma or Canary: the other towns are Calder, Tirachana, and Luz.

CANARY, called also *Palma*, in Latin *Civitas Palmarum*, and in Spanish *Ciudad das Palmas*, the capital of the preceding island. Although the governor and the chief people of distinction commonly reside at Teneriffe, yet Canary is the see of a bishop, suffragan to the metropolitan of Seville in Spain, who usually resides in this town, and has a tribunal of inquisition. The royal audience, or sovereign council of the Canaries, over which the governor presides, is held in this town, and receives appeals from all the other islands. The revenues of the bishop, amounting to 10,000*l.* a year, are almost entirely distributed in acts of charity through all the islands; and the present bishop (see *Emb. to China*, vol. i. p. 117.) joins to this humane disposition, the rigour of ecclesiastical discipline, and encourages the observance of ceremonies of piety, by offers of indulgence to those who practise them. This town is seated on the south-west side of the island, at a small distance from the sea. Its climate is temperate; its extent about a league in circumference; its cathedral is magnificent; and its houses, though only one story high, and flat at the top, are generally elegant buildings; it has four convents. The number of inhabitants is estimated at 12,000. N. lat. 28° 10'. W. long. 15° 36'.

CANARY *Islands*, a cluster or groupe of islands in the Atlantic Ocean, situate about 150 miles to the west of the empire of Morocco in Africa, between N. lat. 27° 15' and 30°. W. long. 13° and 17° 30'. They are generally supposed to have been the same with the *Insule Beata*, or *fortunate islands* of the ancients, particularly described by Ptolemy and the elder Pliny, and so called on account of the singular temperature of their climate, the fertility of their soil, and the excellence of their fruits. Ptolemy, however, if he meant these islands, has placed them 11° too near the equinoctial, or in the 16th degree of N. latitude, whence some have concluded, that this appellation belonged to the Cape de Verd islands. But Strabo assigns them a situation which agrees with the observations of modern geographers. Some have derived their name from *canis*, dog, on account of the number of large dogs which were found on the island Canaria or Canary, two of which were presented to Juba, king of Mauritania. Others deduce the origin of the name from the Canaanites, or Phœnicians, who are said to have often sailed from the continent to Carne, supposed to be a contraction of Canary. The number of the Canary islands has been differently stated, both by ancient and modern geographers. Pliny and Ptolemy reckon six; Plutarch and others mention only two; modern geographers have generally reckoned 13, exclusive of Madeira, which is at a considerable distance to the north: but the inhabited islands have

have been reduced to seven, viz. Palma, Gomera, Ferro, Teneriffe, Grand Canary, Forteventura, and Lancerota; see each respectively. To these have been added the following six small islands, viz. Lobos, Roca, Graciosa, Santa Clara, Allegranza, and Inferno, besides a cluster of rocks, called the Salvages, between Madeira and the Canaries. Teneriffe, though not the largest, is probably the most fertile of the Canary islands, and its population amounts to nearly 100,000 persons. That of the Grand Canary has been already stated; that of Palma is estimated at 30,000; of Forteventura at 10,000; of Lancerota at 8000; of Gomera at 7000; and of Ferro at 1500: the total according to this enumeration amounts to 196,500: but others reckon the population of Teneriffe at 64,000, and the whole at 140,000. The air of that island is pure and temperate, and the soil is fertile; the product is wheat, barley, rice, and oats; the excellent canary wine is obtained chiefly from Teneriffe and Palma: Gomera is noted for silk; and the tree yielding the juice called dragon's blood is not uncommon. Fruits of various kinds are of excellent quality, and are cultivated in great abundance. These islands are well supplied with cattle, such as cows, sheep, goats, and wild asses, which run about the mountains in droves; their woods are stored with varieties of the feathered kind, of which the canary birds are well known; and the surrounding seas are stocked with shoals of fish, particularly sturgeon. All the islands have ditches and marshes filled with water at spring-tides, and afterwards evaporated by the heat of the sun, so as to yield a fine sea-salt. Flax, aniseeds, and coriander are cultivated in the different islands. Archil and fumach grow spontaneously. See ARCHIL. Kali is found along the sea-shore, and might afford as good soda as that of Alicant. The cotton shrub and also the sugar-cane are much neglected. Potatoes have within the last 30 or 40 years been introduced in these islands; and at present they constitute almost the chief food of the inhabitants. Wheat and barley are sown in November and December, and usually reaped in April and May. The corn is carelessly raked together, carried home in sacks on the backs of asses, mules, or camels, and then trodden out by cattle, and the grain separated from the chaff by exposing it to the wind. The lands are not rented in the Canaries: the landholder furnishes the seed and implements of husbandry, and receives one half of the produce, besides a certain quantity of wheat for each head of cattle, which he lends to the tenant. Bread is only eaten by the richer inhabitants. The people in general subsist much on "goffio" which is only parched grain ground by a little hand-mill, of which every cottage possesses one. Those who use better fare have recourse to salt fish and potatoes. The poor inhabitants of Palma and Gomera are sometimes reduced to the necessity of making cakes of the roots of the "pteris aquilina," or male fern, which they dig in the mountains. Lupines are a choice food for cattle; but they are previously soaked in water and boiled with the addition of salt. The capital of the seven inhabited islands is the town of Palma, or Canary, in the isle of Canary.

History gives no certain information with regard to the original inhabitants of these islands. Some say, that they were exiles from Africa, whom the Romans banished thither, after cutting out their tongues, for having blasphemed their gods. But how persons, deprived of the organ of speech, could form any language, peculiar to themselves, and transmit it to posterity, it is not easy to conceive; and, therefore, this circumstance attending their origin is probably fabulous. It is said, however, that all the descendants of the ancient inhabitants speak the same language, though diversified into different dialects. Their clothing consisted of

hides and skins; and they inhabited caves and rocks in perfect harmony and union. Their food was the flesh of horned cattle, dogs, and the milk of goats; and they prepared a kind of pudding, or bread, of milk and tritured corn, called "goffio," which is now common under the same name. The first discovery, as well as the original settlement of these islands, is involved in considerable obscurity. It appears, however, that they were imperfectly known to the Spaniards, in consequence of some of their piratical excursions, about the middle of the 14th century. Pope Clement VI. it is said, having preached a sermon to prove that he had the sole right of creating kings and bestowing kingdoms, exercised the prerogative, Nov. 15th, A.D. 1344, of creating Lewis de la Cerda, descended from the royal family of Castile, king of the Fortunate islands, supposed to be the Canaries; though the new monarch was unable to discover in what part of the world his new dominions were situated. At length, in 1393, or 1395, or, as others say, 1405, some private adventurers from the coast of Biscay extended their piratical excursions as far as these islands; and John de Bethencourt, a Norman baron, obtained a grant of them from Henry III. of Castile. Bethencourt, with the valour and good fortune which distinguished the adventurers of his country, attempted and effected the conquest, and with the consent of the Spanish court, assumed the title of king of the Canaries; and the possession of them remained for some time in his family, as a fief held of the crown of Castile. In 1431 the grant of them was confirmed to John II. king of Spain, or Castile, by pope Eugenius IV.; and in 1483 Ferdinand and Isabella, king and queen of Spain, being before possessed of four of these islands, conquered the island called Grand Canary; and also the two remaining islands; and by the treaty of peace between Ferdinand, king of Castile, and Alphonso, king of Portugal, it was agreed that these islands should belong to Spain, in lieu of the settlements on the continent of Africa, ceded to Portugal: accordingly, they have all remained in the possession of Spain to this day. Those whom the Spaniards found in possession of these islands they denominated Guanches; and the appellation has been transmitted to their descendants. They are represented as gigantic in stature and barbarous in their manners. They were idolaters and polygamists; and their property was common possession. Ignorant of the use of iron, they cultivated the earth with the horns of bullocks, and sheared their sheep, and shaved themselves, with whetted flints instead of instruments of iron. Although they were denominated barbarous, they were singularly humane, and abhorred the idea of shedding blood. When any one of their princes died, they washed his body, and placing him erect in a cave, they put a sceptre in his hand, with two jars by his side, one filled with milk, the other with wine, as the necessary provision for his journey. When Cadamosto visited the Canaries in 1445, each island was divided into a number of provinces or districts, of which Teneriffe contained nine; but among these little states wars overspread the face of the country with carnage and blood; and yet their military weapons consisted merely of stones and two kinds of lances, one armed with horn, and the other wood hardened and pointed in the fire. For protection against the scorching sun in summer, and against the inclement cold in winter, they anointed their bodies with a mixture of tallow and the juice of certain plants, which tinged their skins with various colours, red, yellow, and green; and both men and women used this extraordinary defence and ornament. Each island and each state had its peculiar form both of religion and government; although within the same society every thing was common; viz. religion, customs, language, manners, and property itself. In Teneriffe there were no less than ten different sects of idolaters,

ters, some of whom worshipped the sun, and others the moon, and the rest of the heavenly bodies. Although polygamy was allowed, the virginity of the bride rightfully belonged to the chief; and the parties thought themselves highly honoured when he claimed his right. Upon the accession of a new prince, it was the custom to sacrifice a number of young persons of both sexes in honour of him, and in order to procure blessings upon his reign. This was done by precipitating themselves from a steep rock, after the performance of many absurd ceremonies, till they were dashed in pieces by the violence of the fall. The parents of these insatuated victims were distinguished by the favour of the reigning prince. The present Guanches are stout and robust, though inferior in size and strength to their ancestors. Their complexion is tawny, and their noses large and flat. Their genius is lively; they are brave, active, and cunning, and are much addicted to war. Their appetite is singularly voracious; and they live upon grain formed into cakes with milk and honey; and their food is preserved in skin-pouches, which they suspend to their belts and girdles, and in which they likewise bake them in the smoke. Some rigidly abstain from wine and also from animal food. Such are their alertness and activity, that they run up and down mountains, and spring, by means of long poles, from rock to rock with astonishing agility. In all their contests they use stones, and throw them with a force equal to that of a musket-ball. Dr. Sprat (Hist. of the Royal Society, p. 212, &c.) has related a variety of other curious anecdotes concerning this people. The race of the Guanches, however, is now almost extinct. The few who remain in Teneriffe are entitled to some very trifling stipend, as a price of the submission of their ancestors, from the court of Spain, which they punctually, and with some sensations of pride, annually demand. Many of the dead bodies of those Guanches have been found in perfect preservation, in an erect posture, placed against the sides of caves dug into the mountains; the bodies being wrapped round with several folds of goats' skins. The total net revenue of the crown, after defraying the expences of administration, of all the Canary islands, amounts to about 60,000*l.* a year. See *TENERIFFE*, &c.

CANARY, an island of the South Pacific Ocean. S. lat. $1^{\circ} 51' 36''$. E. long. from Paris $127^{\circ} 35'$.

CANARY bird, in Ornithology, *Canary finch*. See *CANARIA Fringilla*.

CANARY, in Agriculture, a sort of plant cultivated in some of the more southern districts, as Kent, &c. for the small seed which it produces. It is observed, in the Agricultural Survey of that county, "that there are three kinds of tilths for it; namely, summer-fallow, bean-stubble, and clover-lay: the last the writer considers best. If the land is not very rich a coat of rotten dung is frequently spread for it." But whether manured or not, the tillage necessary is to plough the land the first opportunity that offers after wheat sowing is done; and as soon as it is tolerably dry in the spring, furrows should be made, about 11 or 12 inches apart, and the seed sown broad-cast about four or five gallons per acre, and well harrowed in. When the blade appears, and the rows are distinct, the intervals are immediately hoed with a Dutch hoe, and afterwards, in May or June, the hoeing is repeated with a common hoe, carefully cutting up every weed, and thinning the plants in the furrows, if they are too thick. It is cut in the harvest, which is always later than any corn crop, with a hook provincially called a *twibil* and a *hink*, by which it is laid in lumps or wads of about half a sheaf each. The seed clings remarkably to the husk, and in order to detach it the crop must be left a long time on the ground, to receive moisture sufficient to destroy the texture of the envelope, otherwise it would be hardly possible to thresh out the

seed. The wads are turned from time to time, to have the full benefit of the rains and sun, and thereby render them as dry as possible.

It is remarked, that the price of reaping canary in the isle of Thanet was formerly from six to eleven shillings per acre, and the prices of threshing and dressing it five or six shillings the quarter: but at present they are considerably higher. According to the goodness of the land, and the tillage that has been bestowed upon it, the farmers then expect their returns to be from 25 to 50 bushels per acre, but the common crop is from 30 to 34. It was formerly the practice to sow successive crops on the same land for eight or ten years, but this practice is now justly exploded. It is added, that sowing canary would be a very great improvement to lands which lie convenient for water-carriage to London markets, was it not a crop the farmer ought by no means to depend upon, not only because the return or quantity it yields varies greatly, but also on account of the fluctuation in the price of the seed in the markets. Some advise sowing this crop in drills a foot asunder, thinning the plants out afterwards, so as to leave them about two inches distant in the rows. Three gallons of seed in this way are sufficient for an acre, where a hopper is made use of so set by a spring as to deliver the seeds at equal distances. It should be sown about the end of February.

The chaff of this seed affords a large proportion of good horse-food.

CANARY-grass, a sort of grass which can seldom be cultivated with advantage as a meadow or pasture grass: but one of the kinds of which is grown in some districts for the seed. See *CANARY*.

CANARY-grass, in Botany. See *PHALARIS Canariensis*.

CANARY-weed. See *LICHEN Roccella*.

CANAS, in Ancient Geography, a town of Asia Minor in Lycia, which was formerly episcopal.

CANAS and *CANCHES*, or *TINTA*, in Geography, a jurisdiction of Peru in South America, in the diocese of Cusco, commences about 15 or 20 leagues S. of Cusco, and extends about 20 leagues in every direction. The Cordillera divides it into two parts; the highest called *Canas*, and the lowest *Canches*. The latter, by reason of the temperature of its air, yields all kinds of grains and fruits; whilst the former affords pasture for very numerous flocks and herds; and in the meadows between the eminences are fed no less than 25 or 30 thousand mules, brought hither from Tucuma to pasture. Here is a very great fair for these animals, to which dealers resort from all parts of the diocese. In the part called *Canas* is the famous silver mine denominated *Condonoma*.

CANASERAGA CREEK, a creek of North America, which runs north-westward into Genesee river at Williamsburg, in the state of New York.

CANASIS, in Ancient Geography, a town of Asia, seated on the coast of the Erythrean sea, in Carmania, according to the Periplus of Nearchus.

CANASTRON, a promontory of Macedonia, at the extremity of the peninsula of Pallenia, between the Thermaic and Toronaic gulfs.

CANATAGUA, a mountainous ridge which passes N. and S. between the provinces of Veragua and Panama, in the Spanish territories of N. America.

CANATH. See *KENATH*.

CANATTE CORONDE, a name given by the Ceylonese to a peculiar kind of cinnamon growing in that island: this is esteemed the second kind in value, and the name they give to it signifies bitter and astringent cinnamon. The bark of this kind of cinnamon-tree comes off very easily, and is of a very fragrant smell when fresh, but it has a bitter taste. It is not very common in the island, and is not easily dis-

distinguished on the tree from the best cinnamon. The trees which yield the eight different kinds of cinnamon, so very various in flavour and virtue, are all so like one another, that it requires a great deal of attention to distinguish them. The root of this kind of cinnamon-tree yields a very fine sort of camphor. Phil. Trans. N^o 409. See CINNAMON.

CANAVARIUS DEMETRIUS, in *Biography*, a distinguished physician, and voluminous writer in medicine, born at Genoa, in 1559, received his education at Rome, where he became extremely popular as a physician, and acquired a considerable property. He died in 1625. The principal of his works are "De Ligno Sancto Commentarius;" Romæ 1602, 8vo. in which he gives the distinguishing characters of the genuine wood; a spurious kind having found its way into the shops, and been used in its stead, "Ars Medica." Gena fol. 1626. This is a republication of his account of all the diseases incident to the human frame, with the mode of treating them, taken from the most approved writers, originally printed in 8vo at Venice, here much enlarged and improved. Haller, Bib. Med. Eloy. Dict. Hist.

CANAVEZ, in *Geography*, a district of Italy, in the principality of Piedmont, of which Ivrea is the capital.

CANAVEZES, a town of Portugal, in the province of Entre Duero é Minho; 27 miles E. of Porto.

CANAWISQUE, a western branch of the river Tioga, in America, which rises in Pennsylvania.

CANCALE, a sea-port town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the district of St. Malo; celebrated for oysters: 3 leagues E. of St. Malo. N. lat. 43° 41'. W. long. 0° 31'.

CANCANI, or CANGANI, *promontory of the*, in *Ancient Geography*, is placed by Ptolemy in the isle of Albion, and is thought to be Braychipult point in Caernarvonshire.

CANCARELLA ASPARAGI of Valisn. in *Entomology*, synonymous with *cryptocephalus campestris* of Fabricius.

CANCELIER, in *Falconry*, is when a light-flown hawk, in her flooping, turns two or three times upon the wing, to recover herself before she seizes.

CANCELLARIUS, in *Antiquity*. See CHANCELLOR.

CANCELLATA, in *Conchology*, a species of ARCA, the shell of which is marked with cancellated striæ, and bearded; the margin gaping in the middle. Schroet. Inhabits the American ocean.

Obs. In its natural state this kind is covered with a mossy epidermis, or membranaceous coating, beneath which the shell is of a somewhat fuscous colour, mixed with white, and beset on both sides with four tufts of hair; beaks slightly recurved; posterior depression lanceolate.

CANCELLATA, a species of NERITA, the shell of which is marked with decussating striæ and impressed dots; spine slightly clavated; umbilicus gibbous and bisid. This inhabits the coasts of the American islands. Chemnitz.

Obs. This shell is white, and obsoletely spotted, and is sometimes marked with rays or a fulvous band.

CANCELLATA, in *Entomology*, a species of CICADA, found in Denmark. The colour is yellow, with three dots on the scutell, and tip fuscous; wings white and reticulated. Mull. Zool. Dan.

CANCELLATA, in *Ornithology*, a species of TRINGA, seven inches and an half in length, that inhabits Nativity Island. Latham calls it the *barred phalarope*. The upper feathers are brown edged with white; lower ones white with transverse dusky lineations; feet pinnated and dusky.

CANCELLATE, in *Botany*, open like lattice-work. A term applied to the involucre in *atractylis cancellata*, to the capsule of the lily, &c.

CANCELLATUM, in *Conchology*, a species of BUCCINUM, of a small size, mentioned by Seba. The shell is

glabrous, with streaks and lines that variously decussate each other. Native place unknown.

CANCELLATUM, a species of CARDIUM, of small size. This kind is reddish, thin, roundish, with decussating striæ. Gualt. &c.

CANCELLI, in *Building*, lattices, or a sort of windows made with cross bars of wood or iron, chequer-wife.

The term is also applied to the balusters or rails which compass a court of justice, a communion-table, or the like.

CANCELLI, in a *Military Sense*, the same with BARRIER.

CANCELLING, in the *Civil Law*, an act whereby some former deed is rendered null and void.—This is otherwise called *rescission*. The word comes from the Latin *cancellare*, to encompass, or pale a thing. In the proper sense of the word, to cancel, is to deface an obligation, by passing the pen from top to bottom, or across it; which makes a kind of chequer lattice, called by the Latins *cancelli*.

CANCELLING of deeds, letters patent, and wills. See these articles.

CANCELLUS, in *Entomology*, a Fabrician species of GAMMARUS (*Cancer*, Linn.) found in the rivers of Siberia. It is specifically distinguished by having four hand-claws which are destitute of fangs, and sixteen feet. Pallas describes the same insect under the name of *cancellus*, but as an oniscus. This crab is of a small size, being very little larger than *gammarus locusta*, and has the first pair of antennæ incurved.

CANCELLUS arancoides, Petiver's name of *Phalangium reniforme*. Linn.

CANCER, the Crab, in *Astronomy*, one of the twelve signs of the zodiac, and one of the 48 old constellations; ordinarily represented on the globe in form of a crab, and in astronomical books denoted by a figure much resembling that of the number sixty-nine; thus 69. The reason generally assigned for its name, as well as figure, is a supposed resemblance which the sun's motion in this sign bears to that of the crab fish. As the latter walks backwards, so the former in this part of his course begins to go backwards, or recede from us; though the disposition of stars in this sign is by others supposed to have given the first hint to the representation of a crab. The Greeks pretend that when Hercules was contending with the Lernaean hydra, a crab which crawled upon the marsh seized his foot. The hero, however, crushed the reptile to pieces under his heel; but Juno, in gratitude for the offered service, though inconsiderable, advanced the creature to the heavens. The stars in the sign Cancer, Ptolemy makes 13; Tycho 15; Bayer and Hevelius 29; Mr. Flamsteed no less than 83. For an estimate of the comparative brightness of several stars in the constellation Cancer by Dr. Herschel, see Phil. Trans. vol. lxxxviii. p. 311, &c.

CANCER, *tropic of*, a lesser circle of the sphere parallel to the equator; and passing through the beginning of the sign cancer. See TROPICS.

CANCER, in the *Military Art*. See ARIES.

CANCER, in *Surgery*, is a disease respecting which the most enlightened and experienced practitioners, for more than two thousand years, have confessed their extreme ignorance; while some of the illiterate and unskilful part of mankind have never ceased to boast of their specific remedies, and still continue to impose on the unfortunate victims of this destructive malady.

It cannot be at all doubted that numerous cases on record, denominated *cancer*, and perhaps all those in which cures of this disease are said to have been performed without destroying or removing the part affected, were complaints of a very different nature, and sometimes of an entirely opposite character. A large proportion of the remedies employed by

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by empirics and nurses for the cure of cancer includes those means which, after long and mature trial, have been rejected as inefficacious by regular surgeons; and, it is well known, that the more innocent (because less active) ointments, and other compositions, now publickly advertised by cancer-curers, are such as no person could have proposed who had the slightest acquaintance with the real forms of this disease.

The ambiguous and undecisive state of our knowledge in the diagnostic signs of cancer, has been a most fertile source of error and deception; and, "while we remain unfurnished with authentic standards," or established data, "by which all observations may be examined, it ought not to excite surprise, if the same name be assigned to two complaints, the histories of which are repugnant to each other; or, if opposite modes of treatment be directed for diseases that bear a common appellation." See Mr. Pearson's "Observations on Cancer," *pref. p. v.*

A great deal of commendable pains has been lately taken, by the promoters of two public institutions in London, to investigate the nature and treatment of carcinomatous disorders; but, from the first results of their labours, we scarcely can say that any approaches have yet been made towards the attainment of so desirable an object. One of these gentlemen has shewn, with much clearness and acumen, that our best definitions of scirrhus and cancer have been very inaccurate and erroneous; whereas another surgeon, of considerable reputation and experience, affirms that "there can be no difference of opinion respecting the nature of the complaint;" for, says he, "the truly scirrhus tumour, which is known to be capable of forming the cancerous poison, when allowed to increase in size, has been so often described, that every surgeon must be enabled from those accounts to pronounce the tumour, when he meets with it, to be of that kind. See Mr. Home's *Observations on Cancer*, 8vo. Lond. 1805, p. 156. This author likewise thinks he has proved decidedly, "that cancer is not a disease which immediately takes place in a healthy part of the body, but one for the production of which it is necessary the part should have undergone some previous change, connected with disease;" whereas Mr. Pearson has adopted the contrary opinion, viz. "that a cancer is always an original disease, and never appears as the sequel of any morbid affection whatever."

The truth is, we are still in the dark concerning the proximate cause of scirrhus and cancer, or the nature of that peculiarity of constitution in different persons and sexes, which predisposes them to this malignant derangement of animal structure. We do not even know precisely in what the cancerous state of an organ consists; and it is yet debated in the medical world whether or no the disease be local;—although, in our own judgment, the affirmative proposition is always true in the early stages of a cancer.

If we may credit the accounts published by various authors, it appears that there is scarcely any part of the body which is wholly exempted from the attacks of a cancerous affection: but it has been ascertained by reiterated observation, that glandular parts are much more liable to this disease than any other; and it is to a gland only that we are accustomed to apply the term *SCIRRHUS*, which denotes a morbid condition invariably tending to the state of a perfect or genuine cancer.

The name of scirrhus has too vaguely and unguardedly been applied to indurated tumours of the non-secreting or absorbent glands, and hence has arisen the epithet of "venereal or scrofulous scirrh;" so that patients labouring under such indurations have often been alarmed without any necessity. Indeed, Mr. Pearson says, he "never met with an unequivocal proof of a primary scirrhus in an absor-

bent gland." We entirely agree with this judicious writer, that such an occurrence is exceedingly rare; but we have seen at least one case of idiopathic scirrhus in the absorbent glands of the groin, which proved fatal.

A true scirrhus, before it degenerates into a cancerous sore, is hard and unequal on its surface, slightly sensible to the touch, not tending to suppuration, and enlarges very slowly in its commencement; but at length, assuming a more active form, it is surrounded with superficial varicose veins, when it becomes rather painful, and changes the texture of the adjacent cellular membrane or cuticular covering, to which it frequently adheres: the skin will, in this advanced period, sometimes be discoloured, and puckered or retracted, especially in the female breast; perhaps attended with a degree of softness or fluctuation in some part of the tumour, with shooting pains in its neighbourhood; and at last breaking into a malignant sore, with fungous flesh, and retroverted edges, where it is named an open cancer.

Eroding, fordid, and rebellious ulcers will arise spontaneously in various parts of the body, without being preceded by a scirrous tumour; and, as many of these resemble the cancerated sore, in their general appearance and fatal termination, they have been indiscriminately ranked among cancers, for want of a better classification. See the articles *ULCER*, *LEPROSY*, and *ELEPHANTIASIS*.

The scirrous tumour, above described, which has a constant tendency to degenerate into a confirmed cancer, (though not always equally rapid in its progress) will seldom or never yield to discutient applications; and should therefore be extirpated without delay, if the circumstances of the patient do not otherwise prohibit this operation. The scirrhus, on its removal, will exhibit a somewhat different appearance in its structure, according to the progress it has previously made towards maturity. In its early stage, the centre is more dense and semi-cartilaginous than the circumference, the whole being intersected by irregular bands of a ligamentous texture, blended with glandular substance; but as it advances, this central point is less observable, although the intersecting filaments still exist, and an irregular spongoid cavity is formed within the tumour, filled with a bloody fluid. Sometimes the mass is composed of several distinct portions, enveloped by the ligamentous bands disposed in concentric circles; and in other cases there are cysts of various magnitude, in different parts of the tumour, which Dr. Adams believes to be real hydatids, possessed of vitality.

Means have been adopted by several practitioners at different times, to analyse scirrous or cancerous masses; but without affording, hitherto, any satisfactory results. Indeed, the tests to which they have submitted these morbid substances must have entirely decomposed them and altered their nature; so that, probably, we shall not obtain much useful information by having recourse to chemical agents for this purpose.

The chief desideratum in surgical practice, is to discriminate between scrofulous indurations and scirrous tumours in the living body; for it is a question, on which the well being of patients must often depend, to determine the precise nature of a disease, before we proceed to active measures. Notwithstanding the apparent confidence with which Mr. Home, in a passage we have quoted, ventures to pronounce respecting the facility of distinguishing and ascertaining a scirrous affection, he, in another part of this book (p. 167.) acknowledges himself to have frequently been mistaken in his diagnosis; and these are his words:

"So much does the same disease differ in its appearances, in different patients, from the endless peculiarities of their constitutions, by which every part of their body must be
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more or less influenced, that it is not possible in practice to distinguish, in all cases, between cancerous and scrofulous tumours, after they have advanced to a certain size; and I am ready to confess that, in many instances, I have mistaken the one for the other, and have removed, by operation, tumours which, at the time, had the appearance of being cancerous; and upon examination, after their removal, found them of a scrofulous nature. On the other hand, I have neglected to remove tumours, from the circumstances making it probable that they were scrofulous; which afterwards became cancerous, and destroyed the patient."

In all such doubtful cases, it is the safest rule to advise the removal of the tumour, if it be situated fairly for the operation; as it is a much less serious inconvenience to get rid of a diseased scrofulous gland, than to retain a scirrhous tumour, which probably might cost the patient his life, in the event of its contaminating the adjacent parts by its malignity. There is reason to suspect that many surgeons, who boast of their extraordinary successes in extirpating cancers, have sometimes dissected out tumours which might very innocently have remained: for the surprising disparity we find, in the results of the practice of different surgeons, is not capable of being reconciled by any other supposition.

Thus Mr. Nooth asserts "that in 102 scirrhous cases, in the early stage of the disease, where he performed the operation, all remained free from any return of the complaint;" whereas Dr. Monro sen. says, "of sixty cancers, which he had seen extirpated only four remained free of the disease for two years," and these became cancerated afterwards!

This report of the late Dr. Alexander Monro (in Edin. Med. Ess. Vol. 5.) is so very discouraging, that it will not be improper to suppose the failures in those cases arose from some peculiarly untoward circumstances; and yet we have another account, by Mr. J. Hill, "of no less than 88 genuine cancers, all ulcerated except four," being extirpated by himself, and "all the patients but two recovered of the operation." Mr. Hill says, "of the first 45 cases, only one proved unsuccessful: in three more the cancer broke out in different places; and a fifth was threatened with some tumours at a distance from the original cancer; these tumours did not appear till three years after the operation; but the woman was carried off by a fever before they had made any progress. All the rest of the 45 continued sound so long as they lived, or are so to this day; one of them survived the operation above 30 years; and 15 are still alive, though the last of them was cured in March 1761.

"Of the next 33, one lived only four months; and, in five more, the cancers broke out afresh after having been once healed.

"The reason why, out of 45 cases, only four or five proved unsuccessful, and six out of 33, was owing to the following circumstance: the extraordinary success I met with made cancerous patients flock to me from all corners of the country, several of whom, after delaying till there was little probability of a cure by extirpation or any other means, forced me to perform the operation, contrary both to my judgment and inclination.

"Upon a survey in April 1764, the numbers stood thus:

" Total cured	-	-	-	63
" Of whom, when cured, there were aged between	-	-	-	70 and 80, 15
				60 and 70, 17
				50 and 60, 18
" Below 50, or ages unknown				13
				63

"Of the above 63, there were alive in April 1764,

" Aged between	80 and 90, 4
	70 and 80, 8
	60 and 70, 12
" Below 60, or ages unknown	15
	In all 39

"In 28 of the above number, the operation had been performed more than two years before.

"In 11, the operation had been done in the course of the two last years.

"So that, upon the whole, after a course of 30 years practice, 39 of 63 patients were alive and found.

"From the above survey, it appears, that the different patients lived as long after the extirpation of the cancers as, according to the bills of mortality, they would have done, had they never had any cancers, or undergone any operation.

"The remaining 25, which compleat the 88, were cured since the year 1764, 22 of whom have been at least two years cured: one or two of these patients were 70 years of age, one 90.

"Mrs. Mundal was 90 when she got a cancer cut off her cheek, 28th June 1768; another appeared on her under-lip in 1770, and was extirpated on the 5th of April that year. After both which she recovered; but a tumour appeared below the maxilla, which carried her off in November 1771, above three years after the first excision; that is, when she was 93 years old.

"The sum therefore at present, July 1770, stands thus:

" Of 88 cancers extirpated, at least two years ago,	
" Not cured	2
" Broke out afresh	9
" Threatened with a relapse	1
	12

"Which is less than a seventh part of the whole number.

"At this time there are about 40 patients alive and found, whose cancers had been extirpated above two years ago.

"Of five cancered breasts, only one was ulcerated, which, with one of the occult kind, did not heal; a third relapsed, probably owing to the whole not being fully cut away; the other two are still firm and found in 1772, though one of them was cut October 25th 1761, and the other April 26th 1766." See Mr. Hill's Cases in Surgery, 12mo. Edin. 1772.

This author's experience, we perceive, was by no means so discouraging as that of Dr. Monro, nor was it so completely unsailing as that of Mr. Nooth: but it should be remarked, that Mr. Hill's cases were much worse, and more advanced than those of Mr. Nooth, while the circumstances are not known which occasioned the ill success alluded to by Dr. Monro. Upon the whole then, we think the numerous patients who are afflicted with external cancers need not sit down in despair; as if it were useless to undergo the operation, when performed in due time, and by a skilful surgeon. The result of our own practice has not been so favourable as that of Mr. Nooth, but has proved at least as successful as Mr. Hill's; and we have no reason to doubt that our contemporaries have been equally happy in their experience after the operation.

To avoid the distress and pain attendant on such a surgical operation as that of cutting out the part affected, a great variety of means, both external and internal, have been proposed for the cure of cancer: these may be ranked under the several heads of 1. Discutients.—2. Corrosives.—

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3. *Narcotics.* We could subjoin a long list of those remedies from the vegetable, animal, and mineral kingdoms; but since no surgeon of reputation will trust to any of them, after the varied trials which have been so often made, both in this country and upon the continent, we shall not extend the present article by reciting their names and supposed qualities. A few words may, however, be added respecting the most eligible means of palliating symptoms either before the cancer is confirmed, or when it has gone on to a state of ulceration, and cannot be extirpated.

Many hard swellings in the breast, especially those of a scrofulous kind, and such as appear after child-bearing, have been mistaken for cancerous tumours; but they may generally be dispersed by the early and repeated application of leeches, bathing with camphorated spirits, soap liniment, hemlock poultices, saturnine lotions, or gentle rubbing with mercurial ointment. It has been justly observed by Mr. Home, "that the success met with in some of these cases is often productive of material mischief, by inducing the practitioner to be too sanguine, and to go on with the use of the same means in other cases, encouraged by his former success, till the disease has arrived at the state of a true cancer; and therefore has advanced beyond that stage in which it might have been removed by the operation of extirpating the tumour."

It is of great importance, on the one hand, not to alarm our patients prematurely, by giving too hasty and unfavourable an opinion; but, on the other hand, practitioners would do well to weigh all the circumstances which may enable them to decide on the nature of such tumours, and if they are confident of their being carcinomatous, to lose no time in advising the only step which can be taken for the security of the unfortunate sufferer.

The following are Mr. Hill's rules of determining whether an external swelling be of a cancerous nature or not; viz.

"1. When scirrhus tumors are considerably advanced, they are surrounded with large varicose veins, resembling crabs claws, from which resemblance they have got the name of cancers. The absence of these, therefore, is a favourable circumstance, but not to be absolutely depended on.

"2. The skin of a cancer, when near bursting, is of a reddish blue, or a blue livid colour, adheres to the under part of the indurated gland, (from which it was originally detached), and is puckered up into ugly folds, as if scorched."

"3. On the other hand, the struma, or boil, when inflamed, is always accompanied with a fever, which keeps pace with the degree of inflammation. But a cancer is never attended with a high inflammatory fever. It is true, the excessive pain of a cancer sometimes quickens the pulse, but at the same time sinks it.

"4. The skin of the inflamed struma, or phlegmon, instead of being wrinkled or plaited, is smooth, red, and stretched, so as sometimes to have a glazed appearance; and, when near bursting, the matter is always found fluctuating below, which seldom happens in cancers. On the contrary, cancers are generally accompanied with a corroding humour, which abrades the cuticle, till the outer parts are consumed; but no matter is perceived within; whereas, in the struma, &c. the scarf-skin is the last part that gives way, unless it be scalded or fretted by too hot poultices.

"5. The cold scrophulous tumor is in still less danger of being mistaken than the inflammatory kind. For the pain and hardness are not so conspicuous as in the inflammatory tumor; and the matter accumulates for a long time before it bursts. In either kind, if good pus appear, there is no occasion for being afraid of a cancer: and, although the

pus should not be of the most laudable kind, but of a whitish sanious aspect, still it is never so acrid as that which proceeds from a cancer. Nay, even a red, bloody, or sanious matter, is not of itself a characteristic symptom of a cancer. Excepting the case mentioned above, I have never seen any cancer that contained matter; but I have seen numbers of other ulcers, in bad habits of body, full of bloody ichor."

The boasting cancer-curers of our time have not sufficient knowledge to discriminate between the different kinds of tumours they meet with, and perhaps too little honesty to confess that the cases in which they have ultimately had some success were really not cancerous; for such an acknowledgment would annihilate their traffic, and destroy their ill gotten reputation. But our own opportunities have enabled us to affirm, that this mercenary class of practitioners subsist chiefly by imposing on the credulous and inexperienced part of mankind, especially the weaker sex, who are terrified with curable disorders, falsely named cancers.

Supposing it to be ascertained that a cancer exists, and it has proceeded to a state of ulceration, not admitting of a surgical operation, the patient should avoid using any means of relief which irritate and give pain; unless it be proposed to destroy the whole by a caustic, which indeed is a far more tedious, uncertain, and tormenting plan of treatment than by cutting out the part.

The topical applications to an open cancer, which have been found most useful to alleviate pain, cleanse the sore, or to correct the fetid smell arising from it, are as follow:—

1. Fresh bruised hemlock leaves.—2. Scraped young carrots.—3. The fermenting poultice.—4. Finely levigated chalk.—5. Powdered charcoal.—6. Carbonic acid gas.—7. A watery solution of opium.—8. Liquid tar, or tar-water. The internal remedies which have been most beneficial are, 1. Very small and long continued doses of arsenic.—2. Liberal doses of cicuta.—3. The free use of opium.—4. Belladonna.—5. Solanum.—6. Martial flowers.—7. Corrosive sublimate.—8. The juice of clivers or goose-grass. But neither the external nor internal remedies, however apparently useful for a time, can be in the least depended on for the cure of a genuine confirmed cancer.

The removal of scirrhus tumours and cancerous excrescences may be effected in various external parts of the body; but no surgeon perhaps could now be found to undertake the excision of any internal organ, for example the uterus. Attempts have been often made by ignorant and bold empirics to destroy a cancerous ulcer of the womb by corrosive injections; but the practice is as cruel as it is absurd, and we have seen the most dreadful consequences from such attempts, without affording the smallest relief to the unhappy patient. Several examples are recorded of the uterus having been excised, and some of these women have survived; but no case, that we know of, is related of such an operation being performed for the purpose of extirpating a cancer, although we are aware that it has been lately proposed by a speculative writer of Germany. See *Med. and Phys. Journ.* vol. xi. p. 34.

The circumstances which indicate the propriety of an operation are these:—1. When the cancer is so situated as not to expose any large blood-vessels or nerves to be cut during the operation.—2. When the whole of the morbid parts can certainly be removed.—3. When the disease has arisen from some accident, and not spontaneously.—4. When the patient is otherwise healthy.—5. When the cancer has not shewn evident symptoms of considerable malignancy during its progress, and does not seem to have involved the adjacent glands or absorbent vessels. The two first of these requisites are not to be dispensed with; for unless we can dissect

fect out all the morbid parts, without incurring the danger of dividing important nerves or arteries, this operation must never be attempted.

The mode of operating will vary in different cases and situations. Some excellent directions are given on this subject by Messrs. Fearon, Home, Pearson, Bernstein, Richter, Le Dran, Sabatier, and Callisen; which young surgeons should consult, in particular emergencies: the only general rules we can here lay down are,

1. To make the external wound nearly in the direction of the subjacent muscular fibres, and to make it large enough for the removal of all the morbid parts.

2. To save all the skin which is not diseased, unless there should be too much to heal up neatly.

3. To secure every bleeding vessel, by a ligature, which might hazard a subsequent hæmorrhage.

4. To maintain the lips of the wound in close contact, without interposing any dressing or extraneous substance between them.

5. To preserve the parts in an easy and steady position for some days, before they are looked at or opened.

6. To use no other than mild and cooling applications during the cure.

The only point of importance on which we have as yet offered no observations, but which will nevertheless be deemed highly deserving of general attention, is the comparative advantages and disadvantages attending the modes usually employed for the extirpation of cancers.

This is a subject, respecting which, unprofessional readers, especially those who suffer from the complaint, may naturally desire to make up their minds; and, on that account, we shall not hesitate to lay before them the judicious remarks of a late author, who has treated this question very amply. See Home's *Observ.* pp. 178—189.

"There are two modes by which a cancer may be extirpated; one is, taking out all the parts that are diseased, by a cutting instrument; the other, making use of such applications as will render them dead, and thereby occasion their being thrown off.

"The advantages attending the operation by the knife are such as to give it a decided preference in all cancerous diseases. It is the only mode which is capable, in the more advanced state of the disease, of removing the contaminated parts to a great extent; and, in doing it, the surgeon is enabled to take away with precision every part he thinks liable to have been affected. When the operation is over, he can examine the diseased part that has been extirpated, and see whether it is every where surrounded by healthy parts; and, if it is not, by referring it to its natural situation can remove any part which may give him the least cause to suppose that it is contaminated. The skin, after such an operation, is in a loose state, and admits of its edges being brought together, so that the wound may always be much diminished in size; and, in very many instances, the cut edges may be brought together like those of a simple incision.

"The operation is only of a few minutes continuance, and the moment it is over, the parts are in a state to commence the process which is necessary for their recovery; and in the course of two or three weeks they are entirely healed, even where the disease has not been completely removed.

"The modes of deadening the diseased part, which have at different times been employed, are three; and as these have sometimes been preferred to the operation by the knife, and some of them are still in use, it becomes necessary to explain in what way they acquired their reputation, and to shew the disadvantages which attend their operation.

"In the earlier times, when the knowledge of cancer was still more imperfect than it is at present, an idea was entertained of its growth being similar to that of a vegetable; and it was therefore thought that unless it was taken out by the roots, the disease was not completely removed. It was then found that very active caustics were capable of deadening the whole tumour, which is always more or less of an irregular form; and when the diseased part was thus brought away, the projecting portions were considered as the roots of the cancer; and the proof of its being completely eradicated was, that the sore readily admitted of being healed. Any recurrence of the disease from the contaminated parts, which had not been destroyed, was supposed to arise from the constitution having been in a diseased state, and not from any failure of the action of the caustic: and in this way the original idea of its being a constitutional disease was most probably formed.

"The fact is, that diseased parts have less powers of supporting themselves than healthy ones, and therefore are more readily destroyed; so that a powerful caustic acts to twice the extent, in a diseased part, to what it does in a natural one; and an indolent tumour can have every part of it deadened by means that would only produce a violent inflammation upon the common skin. It was therefore by no means an unfair conclusion, till it was contradicted by experience, that such applications as were capable of deadening every part that was in a diseased state without acting upon the healthy surrounding parts, were to be preferred to the operation by the knife; and it is within my own remembrance, that such an opinion was general in London. Since that time, two things have been ascertained, which prove, that when the tumour has become cancerous, such caustic applications are incapable of removing the disease entirely; the one, that when the poison is once formed, the contamination precedes and extends beyond the diseased alteration of structure; the other, that every thing which irritates the diseased part increases its action, and its power of contamination: and in fact, all regular practitioners have laid aside the arsenical applications to cancerous tumours in the breast, in consequence of finding that the disease was rarely removed by them.

"They still retain a certain degree of reputation, and are used by several empirics in London; and cures performed in this way are well authenticated; that is, they succeed when applied to tumours which are yet in an indolent state, if they are sufficiently powerful to destroy the whole tumour, and as there is no possibility of ascertaining what the structure of the tumour was, which has been thus destroyed, it is stated by the practitioner to have been an inveterate cancer, which is attempted to be proved by shewing its roots, or the irregularities upon its external surface. But the caustic, when too weak for the destruction of the diseased part, irritates, and makes it sooner become cancerous. When applied to a cancerous tumour, although strong enough to deaden the whole, it irritates the surrounding parts that have been previously contaminated, and makes them sooner assume the characters of the disease. This not only happens when caustic applications are used, but when mortification takes place from any other cause, as in the case stated in a former part of this work.

"This fact of the contaminating power of morbid poisons being increased by any thing that irritates the diseased parts, is not peculiar to cancer. It happens also in the venereal disease, of which too many instances have come under my own observation.

"It has been, for some years, a favourite practice to attempt the cure of chancres by touching them with caustic, while yet of a small size, and repeating the application till

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a sound surface is exposed, after the slough has been thrown off, and then to allow it to heal. The effect of this practice is exactly similar to what has been stated. The chancre is cured, but the poison is absorbed, and the constitution contaminated by the disease. But if the chancre be so small, when the caustic is first applied, that the whole ulcer and some of the surrounding parts are deadened completely by one application, the patient will then be perfectly cured of the disease; as there was not time for absorption before the application was made, and its effects were such as to preclude its taking place afterwards. If, on the contrary, the first application only destroys a part of the disease, it irritates the absorbents, and gives them a disposition to take up the poison at an earlier stage than is usual. From an experience of this being the case, I have for many years entirely left off the practice of using such modes of treatment, in the early stages of chancres.

"The caustic applications which have been employed for the destruction of cancerous tumours are the following: arsenic, corrosive sublimate, and the actual cautery. As these means are also used for the purpose of removing other tumours, whose structure prevents the knife from being employed, I have had frequent opportunities of making observations on their comparative effects. Indeed the statement contained in the second case which has been mentioned in this volume, explains their different effects upon the same person, so as to afford us the most satisfactory information respecting them.

"The only preparation of arsenic which I have used, is equal parts of the white arsenic and sulphur; these proportions were first recommended to me by Mr. Clinck. This acts as a powerful caustic, and appears capable of destroying any tumour which has not acquired the disposition to throw out a fungus. The sloughs formed by each application will be very much in proportion to the quantity of the powder applied. By this means I have removed a large tumour in the cheek, which appeared to be taking on the previous state to becoming a cancer. I have also destroyed a large tumour in the foot. In the last case it certainly affected the constitution, in a manner very similar to what has been already described. In the other, no such effect was produced; so that it would appear that the arsenic is in some cases absorbed more readily than in others.

"The local effect of arsenic is that of producing so violent a degree of inflammation in the part to which it is applied, that mortification ensues. When applied to the stomach, indeed, it destroys the patient before mortification absolutely takes place; and the apparent effects of inflammation upon the part, are not such as would destroy life, were they produced by any other cause. It is to be presumed therefore that the arsenic, taken internally, kills by being absorbed, and producing effects in the circulation incompatible with life. Several instances of patients dying from the effects of arsenic upon the internal coat of the stomach have come under my observation, and specimens of its local effects are preserved among the morbid preparations in the Hunterian Museum.

"Corrosive sublimate appears to act both locally and constitutionally, as well as arsenic. Its local effects are however less powerful, destroying parts to a less extent, and the constitutional effects from absorption are more like those common to the different preparations of mercury than to those of arsenic.

"The actual cautery is at present almost entirely disused in surgery, except in cases of diseased bones, where it is employed to produce death in the part affected, and in that way, put an end to the disease. It is a much milder application than either of the above, gives less pain while acting

locally, and produces no constitutional disturbance; and where it is necessary to keep at bay a fungous excrescence, whose growth is not very luxuriant, I should prefer it to the others, from a belief that it does not in the same degree hurry on the diseased action of the tumour. In cases of fungous tumours in the mouth, it is the only means that can be employed; and in an instance of that kind, the disease was kept under for seven or eight months, by its occasional use, without much pain being produced, or the disease being at all advanced in consequence of the application.

"This account of the effects of caustic applications is given in this place, to shew in what they differ from the operation by the knife; and when compared with it, what are the disadvantages, in cases of cancer; although in other tumours, of a less malignant nature, they may be employed with success."

Desiderata relating to Cancer and Scirrhus.

The following inquiries were suggested by the perusal of a paper which was printed and distributed in the year 1803, by the medical committee of an institution set on foot for the relief of persons afflicted with cancer. The writer of this article, however, has not thought it necessary to confine himself exactly to the plan which is prescribed in that paper; but has considerably increased the number of *queries*, with a view to shew readers in general how many difficulties exist on a subject which certain impostors and credulous persons affect to thoroughly understand.

Query 1. Is there any peculiar habit of body, or mode of living, in either sex, which disposes persons to the formation of cancer, or which enables them to resist its influence?

2. It is well known that at certain periods of life, especially in females, this disease is frequent in its appearance: on what physical causes does that liability depend?

3. Are there any means by which the actual formation of a cancer might be prevented, in families where this disease has seemed to be hereditary?

4. Do persons ever suffer in their childhood, or before the time of puberty, from spontaneous attacks of cancer?

5. Does a child become cancerous by sucking a cancerous woman; or could this disease be produced by transferring the virus from one subject to another, in a way of accidental inoculation?

6. Are there any parts of the body exempted from ever assuming this disease; and why do certain organs more frequently become affected than others?

7. Is it clear that the disease called cancer in some brute creatures exactly resembles this complaint in human beings?

8. Has climate or local situation any influence in rendering the human constitution more or less susceptible of cancer?

9. Do the cancers which arise in consequence of particular employments (as chimney-sweeping) at all differ in their nature from those which affect persons under dissimilar circumstances?

10. How many kinds or diversities of cancer are there; and do they all, in their several stages, properly come under the same generic appellation?

11. Is there any well marked affinity or relation between cancer and other diseases, in their origin, progress, termination, or difficulty of cure?

12. What are the specific differences between scirrhus, carcinoma, lupus, noli me tangere, fungus hæmatodes, elephantiasis, and syphilis?

13. Does the existence of a cancer in any one part of the body afford a presumption that there is a cancerous diathesis, or tendency to a similar morbid alteration of other parts, in the same subject?

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14. May cancer be regarded at any period of its duration, or under any circumstances, merely as a local disorder; i. e. limited to the spot which is visibly affected, and not necessarily contaminating (although tending to contaminate) other organs?

15. Has it been incontrovertibly decided, whether external injuries give rise to cancer in any other way than by rousing to action a disease virtually existing, or at least which was predisposed to make its appearance?

16. Does this inherent disposition or dormant cancerous tendency imply a morbid change capable of detection, and of being rendered quiescent by artificial preventive measures?

17. In what sense may it be admitted that cancer, or the carcinomatous disposition, is ever hereditary? And are there any well authenticated facts to support this notion, in any other sense than as children may inherit the same organization or bodily structure which their parents possessed?

18. Is it certainly known and proved that one particular constitution or temperament of body pre-disposes to this disease?

19. Is the cancerous matter of a volatile and infecting nature, so as to generate this disease in a healthy person, (without real contact) by effluvia in the atmosphere exhaled from a cancerous sore; or does it only contaminate by direct absorption of the virus?

20. Can the essential form of any other disease be so changed as to assume a carcinomatous state, and finally to degenerate into a cancer.

21. Are there any physical signs, either local or general, by which we can foretel that more obvious morbid change named cancer; or does there necessarily occur any visible alteration of structure in a part, prior to its being absolutely affected by this disorder?

22. Has a genuine and confirmed cancer been cured by art, without extirpating or destroying the morbid mass?

23. What is the surest and most effectual method of eradicating cancers of every description?

CANCER is a *Surgical* term also applied to a species of bandage for the head, and divided into several parts, resembling the legs of a crab-fish.

CANCER, in *Zoology*, one of the genera of apterous insects in the Linnæan system. It is also a subdivision or family of the Linnæan *Cancrini* moulded into a distinct genus in the Fabrician *Entomologia Systematica*, and other works of that writer, and a genus of crustaceous animals distinct from insects with Cuvier, La Marck, Latreille, Bosc, and others.

Under the generic title of cancer, Linnæus comprises all the species of crabs, lobsters, shrimps, hermit or parasitic crabs, and in a word every animal of the true crustaceous kind that appears to have been known to him, with the exception only of the two genera *Monoculus* and *Oniscus*, both which are separated by him from cancer.

Linnæus was induced to consider the *cancrini*, and the two last-mentioned tribes of crustacea, as insects, principally from the circumstance of their being furnished with antennæ, possessing articulated limbs or legs, and having the body covered with a solid crust. Being destitute of wings these are referred to the last order of insects *Aptera*, where they follow the genus *Scorpio*, and precede the two analogous tribes *Monoculus* and *Oniscus*. That Linnæus was not strictly correct in placing the *cancrini* with insects, even according to his own definition of the insect tribe, is evident, but the objections so far as they regarded exterior characters were of little consequence, and after his system had become generally known the *cancrini* were admitted without further inquiry as genuine insects into every entomological cabinet. The

French naturalists of the present day do not, however, consider them as insects; but independent of those there are indeed few who, either from accustoming habit, or opinion, founded on the Linnæan method, do not acquiesce in considering them as a branch of entomology.

From the earliest times, in which mankind appear to have discriminated with tolerable precision the affinity which natural objects bear to each other, and their relative position in the chain of nature, crabs and lobsters were supposed to belong to the piscivorous tribes of animals, and not to insects. But they were inattentive to those minutiae of character which in the present state of science we are compelled to have recourse to; those animals were inhabitants of the waters, and in their ideas must of course partake of the nature of fishes. The Greeks and Romans entertained this notion; they admitted them as a race of creatures strongly allied to fishes, and from being covered with a shell as forming an intermediate link between fishes and the covered or testaceous mollusca, or what is commonly understood even at this time amongst us by the name of shell fish. In this light only they were viewed by succeeding generations even till the time of Linnæus, who in his great reform of the animal kingdom thought it necessary to separate them entirely from the covered mollusca, and place them among insects.

How far Linnæus was right in rejecting the established though vulgar notions that had prevailed among mankind for so many ages, remains to be examined. To a cursory observer it must appear strange, we had almost said unphilosophical, to be told by those to whom they look up for scientific information, that crabs and lobsters belong to the same class of animated beings as beetles, moths, and butterflies. But we are not to be governed by prejudices, nor by the veneration we are too apt to entertain for the knowledge of past ages in those matters where our own judgment may be employed with equal or greater certainty; they may really have a natural affinity to each other without being obviously so in their external characters. Cetaceous animals are called fishes by the bulk of mankind, though the naturalist is fully satisfied they have scarcely any other relation to fishes than exterior figure, and living in the same element. The opinion also that crabs and lobsters are insects, as Linnæus describes them, is sanctioned by the authority of so many writers of ability that we cannot be too cautious in venturing to discountenance an opinion so well supported. It is a matter of discussion that claims the most mature deliberation of the naturalist, and fortunately one that has undergone investigation by men well qualified for the task, or it would be impossible to do it justice within the limits of our present article. The leading particulars may be explained; and if from the result of these it should appear that the crustacea ought really to be separated from insects, neither the opinion, nor the example of Linnæus, or his admirers, should deter us from moving them to a more applicable station in the scale of zoology. The question is plain, and resolves itself to this point. Is Linnæus correct or not in placing the *cancrini* among insects? and if he is wrong in this respect, not the *cancrini* alone, but the *monoculi*, and other true crustacea, must be referred, as well as the cancer genus, to some new order or tribe perfectly distinct from and independent of entomology.

Were it not for the following characters which the crustacea possess in common with insects, there are circumstances attending them that might at once forbid us to place them where Linnæus has. Like insects they are furnished with antennæ, and with limbs divided into joints, and in these essential particulars approach so near the apterous order

order of insects, that it would seem almost as consistent to expunge the whole apterous order from the system of entomology as to deprive it of the genus cancer. These reasons have weight with many, and among others with Fabricius. This writer, to whose entomological knowledge we ought not to deny considerable praise, is a tower of strength on the Linnæan side of the question; for like Linnæus he admits the crustacea as insects, although he invariably rejects the Linnæan mode of classing them; however therefore he may dissent from Linnæus in systematic arrangement, he affords him countenance in the most material point under immediate consideration; namely that the crustacea, and of course the cancri, are genuine insects.—But the arguments on the other side are also strong, and in the minds of some may be equally convincing.

It is worthy of remark that our countryman Pennant, a writer, whose knowledge of entomology was confessedly limited, should be the first among modern writers who presumed to divide the crabs, lobsters, and marine onisci from the insect tribes, after the Linnæan *Système Naturel* had been generally adopted throughout Europe, and that without having any other motive than a desire to include those crustacea in his *British Zoology*. He had but a small acquaintance, as he himself expresses it, with insects, and therefore took the liberty of separating the crustacea from insects that he might treat of the former alone. (vid. pref. v. 4. Brit. Zool.) Mr. Pennant was not at that time aware that future naturalists might accede to such a separation as he had struck out by accident, from a conviction of its being both natural and just; but this has ultimately proved to be the case at least to a certain extent.

The idea of crustaceous animals being insects prevailed among the continental naturalists from the time of Linnæus till very lately. Cuvier was perhaps the first who attended with decisive accuracy to the internal organizations of those creatures, if we except Zoëfel, whose investigations, though laborious, were not well directed. (vid. *Insecten-Belustigung*, &c.) The result of those anatomical observations made on them by Cuvier are interesting. They go far to demonstrate, or rather they effectually prove, that the crustacea, and insects are perfectly distinct from each other. Linnæus, it need be scarcely repeated, separated the cetaceous animals, such as whales, porpoises, &c. from the fish tribe, where they had been previously placed by authors, and to which they are so closely allied in figure and habit, because their internal organization did not accord with that of fishes. He proved from the result of anatomical observations, that notwithstanding their external form they are of the mammalia tribe, having a heart with two auricles, and two ventricles, blood warm, and lactiferous teats, and for these reasons refers them to the same order as man and quadrupeds whose internal organization corresponds. The same arguments will bear good in this instance, and if the remarks of Cuvier are correct, crabs, and various other crustacea are certainly not insects. Cuvier found the interior organization of crustaceous animals to be very different from that of insects. In his "*Leçons d'Anatomie Comparée*," he affirms that crustaceous animals breathe and respire by means of gills in the same manner as mollusca, whereas in insects the organs of respiration are ascertained from the experiments of Reaumur, Swammerdam, and Malpighi, to be distributed along both sides of the body; the small lateral spiracles, which we see one on each side every annulation of the body of an insect being the openings, through which the air is received into the tracheal organs; and no such spiracles are found on the sides of crustaceous animals. Cuvier likewise found that the heart of crustaceous animals resembled that of the mollusca,

being muscular, and furnished with vessels for the circulation of fluids. La Marck in his "*Système des animaux sans vertèbres*," follows Cuvier in a similar train of observation, and mentions also, that although insects undergo one or more changes, during which they several times cast their skin, this never happens after the insect has assumed its last or perfect form (his *arachnides*, some of the Linnæan insects of the apterous kinds excepted.) Crabs and other crustacea, he remarks, do not undergo any such metamorphose as insects; their skin or shell is of a different nature, being half calcareous, and is renewed at stated periods, or annually, the old one being thrown off and another growing in its place. Insects, it is further observed, neither couple nor engender more than once in their lives, which seems to be the fact with all (some aptera excepted); but the crustacea, on the contrary, breed many times in the course of theirs. The crustacea, as is particularly noticed by Bosc, have many pairs of jaws, and antennæ most commonly in greater number than insects, the latter having never more or less than two, while the others have almost constantly four; and the antennæ of the crustacea are also of a very different structure from those of insects. These are the most material peculiarities in which the crustacea differ from insects, and which we cannot but allow in our own mind to be sufficient to justify the removal of the crustacea for ever from the tribes of entomology. Firmly as we admire the merits of the great Swedish naturalist, we should not presume to attempt the overthrow of a part of his system so considerable as that under present consideration upon trivial grounds, but the reasons against it are cogent, perhaps unanswerable. We have ever been taught by Linnæus himself to regard the internal organization of animals, as an essential and unerring guide in the natural distribution of the tribes of zoology; it is by this standard the merit of his methodical arrangement of this tribe has been appreciated, and it has fallen to the ground.

The crustaceous tribes, thus separated from entomology, must constitute a new and distinct order of animals. Some difficulty next arises as to the station in the system to which they ought to be referred. By placing them as a separate order immediately after insects, the innovation might create the least confusion; but this is even liable to objection. Cuvier arranges them between the worms and insects, the worms, in his system, contrary to that of Linnæus, occurring first. La Marck places them between the mollusca and the *arachnides*, a new class, comprising most of the Linnæan *aptera*, (crustacea excepted) such as the scorpion, pycnogon, scolopendræ, and others that have *stigmates*, or lateral apertures communicating with the tracheal organs of respiration, and which engender many times in the course of their lives. Latreille's *Tableau Methodique des Crustacées* is placed between the *annelides* (a class of worms,) and the insects, the latter beginning with the *arachnides* of La Marck. See article CRUSTACEOUS ANIMALS.

To follow the French naturalists through the mazes of the various systems proposed for the arrangement of the crabs and other crustaceous animals, is not within the compass of our present design. Those naturalists seem only to agree in the one decided point, that *crustacées* are not insects, each having in turn rejected the mode of classification adopted by his predecessor; so that no permanent arrangement has hitherto been formed, or perhaps ever may; and to embrace the whole, still fluctuating even in the unsettled ideas of their own authors, would only tend to create inexplicable confusion. It will very likely be thought more than sufficient, by the fastidious few, that the writer of this article has followed them so far. In proceeding further he conceives the propriety of forming a new order, as in the present state of

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things it would be impossible to pursue any of those already adopted. That which he proposes is moulded as nearly as possible to the Linnæan method. So far as the plain and simple rules of subdividing the cancri into families rather than genera, as laid down by Linnæus, could be conveniently adhered to, his example is followed; the principal deviations are in those instances where alteration has been rendered necessary by the discoveries of recent naturalists in this tribe of animals, and which are of too much consequence to be overlooked.

The last edition of the Linnæan *Systema Naturæ* comprises only a small number of the species of cancer at present known: his genus cancer is divided into several families, in which the whole of his crabs, lobsters, parasitic crabs, &c. are included. The CANCER genus is thus described. Legs eight, (rarely six, or ten) and two chelate hand-claws, or claws furnished with a moveable pincer; feelers six, unequal; eyes two, for the most part placed on peduncles, elongated, and moveable; mandibles horny and thick; lip triple; tail jointed, and unarmed.—The crabs are separated into two principal sections, *brachyuri*, crabs with short tails, and *macrouri*, crabs with long tails, both which are again divided into several families.

The crustacea are divided by Fabricius into many genera. The Linnæan cancri form a distinct class called *agonata*, in the *Genera Insectorum* of that writer, and comprehend five genera, namely, cancer, pagurus, scyllarus, astacus, and gammarus. His *agonata* class, in *Entomologia Systematica*, contains eight genera, crabs, hippe, squilla, and galathea being added to the preceding, besides some other families of crustaceous animals, as limulus, cymothoa, and monoculus. The same author, in a later work than the foregoing *Supplementum Ent. Syst.* retains part of the Linnæan cancri together in his new class *kleistagnatha*, but divides them into many genera, which he names cancer, calappa, ocyode, leucosia, parthenope, inachus, dromia, dorippe, orithya, portunus, matuta, hippe, and symethis; and in his next class *exochinata* includes the remainder of the Linnæan cancri in the genera albunea, scyllarus, palinurus, palæmon, alpheus, astacus, penæus, crangon, pagurus, galathea, squilla, polydon, and gammarus. La Marck, it is clear, has derived material assistance from the last mentioned work of Fabricius. The system he proposes is very nearly allied to that projected by Fabricius, as will appear on a cursory view of the following statement of La Marck's genera of crabs.

Crustacées pedocles. * Corps court, ayant une queue nue sans feuillets, sans appendices latéraux, et appliquée sous l'abdomen. *Genera*, crabe, calappe, ocyode, doripe, portune, podophtalme, matute, porcellane, leucosie, maia, and arctoplis. ** Corps oblong, ayant une queue alongée, garnie d'appendices ou de feuillets, ou de crochets. *Genera*, alburnée, hippe, ranine, scyllare, crevette, pagure, galathée, palinure, crangon, palemon, squillæ, branchiopode. And among his *crustacées sessilicols*, * Corps couvert de pièces crustacées nombreuses, are crevette (or gammarus), and chevrolle (caprella).

Latreille, in his *Crustacées Malacostracés*, further increases the genera of this natural tribe, constituting altogether thirty-nine genera of those which Linnæus confines to the single genus cancer.

Several of the above-mentioned recently established genera we conceive it necessary to retain as genera, and others as subdivisions of the cancri family in a more compendious form in the following arrangement.

CRUSTACEOUS ANIMALS.

First Order, *Cancri Brachyuri*, Linn.

Head not distinct from the thorax; body short, having

a naked tail, without lateral appendages, or crochets, and folded under the abdomen.

Genus CANCER.

Mouth usually furnished with six feelers; mandibles thick and horny; eyes two, distant, elongated, moveable, and commonly placed on peduncles; antennæ four, short, and filiform, or setaceous, the inner pair (or sometimes both), bifid at the last joint; legs eight or six, and two chelate claws; body somewhat ovate; tail short.

1st Section. * *Thorax smooth, sides very entire.*

Species.

GRAPUS. Front retuse, deflected, and armed with four; body variegated. Fabr. &c.—This is a native of the West India islands, where it is not very common. The colour is whitish, variously, but most elegantly varied with rufous, or red speckled with white, or with minute dottings of red, with a few streaks of the same colour on a white ground, the red specklings pervading the whole upper surface both of the thorax and legs. The hand-claws are comparatively rather small, rough, and of a red colour, bordered with white; body beneath pale.—*Cancer tenuicrustatus* of Herbst. *Cancer*, of which he describes and figures a large and small variety (most likely the two sexes), is certainly a variety of the cancer *grapus* of Fabricius and Linnæus.

MUTUS. Thorax chestnut-brown transversely on the anterior margin. Fabr.—A native of the Mediterranean Sea. The posterior part of the body is truncated; hand-claws smooth; arms denticulated beneath.

QUADRATUS. Thorax square; sides crenated; hand-claws scabrous; *Banksian cabinet.* Fabr.

A native of Jamaica. Size large, exceeding that of cancer *uricola*; the front inflected, and entire; eyes placed nearly together, and pedunculated; eye lid beneath crenated; thorax acute at the sides; hand-claws short; arms toothed at both sides; hands scabrous, with elevated dots; legs hairy; appears allied to the *ocyode* genus.

RURICOLA. First joint of the legs spinous; second and third with tufts of hair. Fabr.—*Cancer uricola.* Linn.

This is the great land-crab of the Bahama islands, the history of which has been so amply detailed by Sloane, Catesby, Seba, and others, that the following particulars, selected chiefly from these authorities, may not prove unacceptable. "These animals live not only in a kind of orderly society in their retreats in the mountains, but regularly march once a year down to the sea side, in a body of some millions at a time, as they multiply in great numbers. They choose the month of April or May to begin their expedition, and then fall out by thousands from the stumps of hollow trees, which they excavate, from the holes which they dig for themselves under the surface of the earth, clefts of the rocks, and other hiding-places. At that time the whole ground is covered with this band of adventurers; there is no setting down one's foot without treading upon them. The sea is their place of destination, and to that they direct their march with the utmost precision. They never turn to the right or left for any obstacles that intervene, if they can possibly pass over them, and even if they meet with a house they will attempt to scale the walls. But though this be the general order of their route, they, upon other occasions, are obliged to conform to the face of the country, and if it is intersected with rivers they are seen to wind along the course of the streams, but if only a small rivulet occurs, they force their passage across it. The procession sets forward from the mountains with the regularity of an army under the guidance of an experienced commander. They are said to be commonly divided into three battalions, of which the first consists.

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consists of the strongest and boldest males, that, like pioneers, march forward to clear the route, and face the greatest dangers. These are often obliged to halt for want of rain, and to go into the most convenient encampment till the weather changes. The main body of the army is composed of females, which never leave the mountains till the rain is set in for some time, and then descend in regular order, being formed into columns of fifty paces broad, and three miles deep, and so close that they almost cover the ground. Three or four days after this, the rear guard follows, a straggling undisciplined tribe, consisting of males and females, but neither so robust nor so vigorous as the former. The night is the chief time of proceeding, but if it rains by day they do not fail to profit by the occasion; and they continue to move forward in their slow uniform manner. When the sun shines and is hot upon the surface of the ground, they halt, and wait till the cool of the evening. When they are terrified, they march back in a confused disorderly manner, holding up their nippers. They try to intimidate their enemies by clattering their nippers together, as if it were to threaten those that come to disturb them. Their disposition is carnivorous, though they most commonly subsist on vegetables; for if any of them by accident are maimed, in such a manner as to be incapable of proceeding, the rest fall upon and devour it upon the spot, and then pursue their journey.

"After a march of sometimes two, or perhaps three months, in this manner, they arrive at their destined spot on the sea-coast, and then proceed to cast their spawn. The eggs are as yet within their bodies, and not excluded and retained, as is usual with animals of this kind, under the tail, for the creature waits for the benefit of sea-water to facilitate their exclusion. For this purpose the crab has no sooner reached the shore than it goes eagerly to the edge of the water, and lets the waves wash over its body two or three times. This has been thought necessary by some to ripen the spawn in the ovaria, as the crab, appearing satisfied with this slight bathing, immediately retires, and seeks a lodging on the land. After this, they say, the spawn grows larger, is excluded out of the body, and adheres to the ciliations, or hairs under the tail. This bunch is seen as big as an hen's egg, and exactly resembling the roes of herrings. In this state of pregnancy they once more seek the shore for the last time; and shaking off their spawn into the water, leave them to the chance of fortune and accident to bring them to maturity. At this time whole shoals of hungry fishes are at the shore in expectation of this annual supply; the sea to a great distance seems black with them, and about two-thirds of the eggs are immediately devoured by those rapacious invaders. The eggs that escape are hatched under the sand; and soon after, millions at a time of the little crabs are seen quitting the shore, and slowly travelling up to the mountains. The old ones, however, are not so active to return; they have become so feeble and lean that they can hardly crawl along, and the flesh at that time changes its colour. The most of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the mouth with leaves and dirt, so that no air may enter. There they throw off their old shells, which they leave, as it were, quite whole. At that time they are quite naked, and almost without motion, for six days together, when they become so fat as to be delicious food. It is said they have then under their stomachs four large white stones, which gradually decrease in proportion as the shell hardens, and when they come to perfection are not to be found. At that time the animal is seen slowly making its way back; and all this is commonly performed in the space of six weeks. This animal, when possessed of its retreats in the mountains, is impregnable, for only subsisting on

vegetables it seldom ventures out; and its habitation being in the most inaccessible places, it remains for a great part of the season in perfect security. It is only when impelled by the desire of bringing forth its young, and when compelled to descend into the flat country, that it is taken. At that time the natives wait for their descent, in eager expectation, and destroy thousands, but disregarding their bodies, they only seek for the small spawn which lies on each side of the stomach, within the shell, of about the thickness of a man's thumb. They are much more valuable on their return, after they have cast their shells, for, being covered with a skin resembling soft parchment, almost every part, except the stomach, may be eaten. They are taken in the holes, by feeling for them with an instrument; they are sought after by night, when on their journey, by flambeaux light. The instant the animal perceives itself attacked, it throws itself on its back, and with its claws pinches most terribly whatever it happens to fasten upon. But dextrous crab-catchers take them by the hinder-legs in such a manner that the nippers cannot touch them, and thus they throw them into their bags. Sometimes also they are caught when they take refuge in the bottoms of holes in rocks by the sea-side, by clapping a stick to the mouth of the hole, which prevents their getting out: and then soon after the tide coming, enters the hole, and the animal is found upon the water retiring, drowned in its retreat.

"These crabs are of various colours, some are reddish, varied with black, some yellowish, and others black, inclining to blue. Those of a light colour are esteemed most, and when full in flesh are well tasted. In some of the sugar islands they are eaten without apprehension of danger, and form no inconsiderable part of the food of the poor negroes."

PAEDERUS. Thorax oblong, with three teeth in front; eyes large and kidney-shaped. Herbst.

Body size of a horse-bean, yellowish, with a ferruginous spot in the middle of the thorax.

RESIDUUS. Thorax subrotund; front on both sides emarginate. Herbst. Mus. Cæsar Viennens.

Body size of a small walnut. Colour entirely olivaceous, inclining to fuscous.

AURANTIUS. Thorax entire at the sides, and retuse before; front truncated and emarginated; hand-claws glabrous; legs compressed. Herbst.

Moderately large; general colour dusky orange, or brownish on the thorax; legs paler and more obscure, last joints furrowed longitudinally.

CORDATUS. Thorax undulated; hand-claws heart-shaped below, and mucronated. Linn.

A large species, being somewhat larger than the ordinary size of our edible, or pound-crab, *Cancer pagurus*. The prevailing colour of the body testaceous brown, inclining to fuscous; legs pale fuscous, and ciliated at the edges. Inhabits Surinam.

ORBICULUS. Thorax orbiculate, smooth, and flat; beak with three short spine-like tubercles. Herbst. Fabr. &c.

A small species of crab brought from New Zealand by sir J. Banks. The snout is short and exserted; thorax slightly depressed, and furrowed with a very entire margin; tail conic; legs smooth.

Obf. Fabr. erroneously refers for a figure of it to Herbst. *Cancr. t. 2. 23.* that being *longicornis*, not *orbiculus*.

LONGICORNIS. Thorax orbiculate, smooth, and smaller than the hand-claws, snout of three obtuse spines; antennæ very long. Linn. &c. Inhabits European seas. Found on the coast of Anglesea, and Kent. Mus. Donov. This, like the preceding, is of a diminutive size.

CHELATUS. Thorax ovate, smooth, less than the hand-claws; snout simple and obtuse; antennæ very long. Inhabits New Zealand. Mus. Banks.

This

CANCER.

This kind has the snout inflected and entire; thorax an elevated, acute, and entire margin. Arms large, projecting, and three-spined at the tip; hand-claw large, ovate, smooth, with incurvated pincers. Antennæ twice the size of the body. Posterior legs filiform, thighs canaliculated.

HEXAPUS. Thorax orbiculate and toothed in front; antennæ longer than the body. Fabr. Linn. &c.

Body rather larger than a pea; hand-claws large; colour pale testaceous. Found in European seas.

PLATYCHELES. Thorax smooth, orbiculate, very entire; hand-claws flat beneath and ciliated; antennæ very long. Herbft. Penn. &c.

Herbst describes *Die breitscheere*, the name by which he calls this crab, as being rare in Europe. His figure is copied from that in Pennant's zoology, upon the authority of which he records it as an English species. It occurs chiefly in our country, on the south coast of Anglesea. Mus. Donovan.

ANATUM. Thorax smooth, globular, crenated, very entire; hand-claws short, pincers two-edged. Herbft. Die endtenkrabbe.

CANCELLUS. Thorax smooth, crenated; margin of the breast prominently crenated; hand-claws two-edged; arms crenated. Mus. Herbft.

Body roundish, about the size of a horse-bean; hand-claws rather long and linear. Colour pale brownish, dotted with white; claws and legs slightly ferruginous.

HISTRIÆ. Thorax slightly orbiculate and smooth, with two teeth on each side; tip between the eyes three-toothed, the middle one largest. Scopoli.

SCOPOLINUS. Thorax subrotund, smooth, somewhat convex above; antennæ capillaceous. Herbft. Nutrix of Scop.

ANTENNATUS. Thorax subovate; antennæ three times as long; hand-claws wedge-shaped. Forskael.

PHILAGRUS. Thorax convex, and fifteen-toothed behind. Linn. This inhabits Asia.

CASSIDEUS. Head shielded, emarginated; arms with filiform appendages. Forster. Gmel.

A native of the Indian Seas. Colour subdiaphanous, variegated with sulphur, orange and green.

TALICUNA. Thorax orbicular and very entire; hand-claws muricated. This crab is four inches in breadth, fuscous, and becomes red in boiling. Flesh excellent. Inhabits Chili.

GRANARIUS. Thorax subovate, smooth, very entire; front cuspidate; eyes cylindrical. Fabr. Slabber.

A minute species of most extraordinary appearance; hardly larger than a grain of wheat. Thorax somewhat ovate, snout consisting of a thick obtuse spine, having a smaller one on each side at the base; the large tubular or cylindrical eyes are placed behind these. General colour pale yellowish. Found in the fresh waters of Europe, but rarely.

MINUTUS. Thorax smooth, very entire, somewhat square, with the edges rather sharp; legs compressed. Linn. Cancer nutrix of Scopoli. Frequent in deep waters.

PUSILLUS. Thorax smooth, square, very entire, with a single tooth on the tarsi. Herbft. &c. Inhabits the North Seas, and is greatly allied to minutus, but is not more than one fourth its size, and is therefore extremely small; it is also depressed and of a pale colour.

**** Section.** Thorax smooth, and cut at the sides.

CORALLINUS. Thorax obovate, one-toothed; front three-lobed. This inhabits India, and exceeds the ordinary size of our largest English crab, cancer pagurus. The thorax is of a fine coral red, variegated with a few whitish

marks, but rather pale towards the posterior end; legs pale reddish; pincers blackish.

FLORIDUS. Thorax smooth, unequal, spotted; margin obtusely serrated; hands crested. Linn.

Canc. incomparabilis, elegantissime pictus. Seba. Inhabits India. The figure in Herbft. p. 39. pl. 5. represents the shell of the thorax, which appears to be of a white colour, with many large and small red protuberances.

APANTORA. Thorax ovate, denticulated at the sides; tail triangular. Molin. Hist. Chili.

BISPINOSUS. Thorax smooth, and two-spined each side; front four-toothed; hands muricated, and toothed. Inhabits India. Size moderate; thorax roundish; colour dirty brown.

MACULATUS. Thorax with round red spots, and one-toothed at the sides; front three-lobed. A native of Asia. Seba.

SANGUINEUS. Thorax obsoletely two-toothed on each side; front four-lobed; hands black. Inhabits deep waters.

XAIVA. Thorax three-toothed at the sides; front truncated. Body hemispherical, and about two inches and a half broad. Inhabits Chili.

MAENAS. Thorax smoothish, with five serrated teeth at each side; front three-lobed; joint next the hands with a single tooth. This is our most common crab, the general colour of which is green, variegated with yellow. Inhabits Europe.

QUINQUE-DENTATUS. Thorax smoothish, with five teeth at each side; front four-toothed; joints near the hands slightly toothed; tail inflected and narrow. Linn. Mus. Lesk.

CIMICOIDES. Thorax orbicular, five-toothed each side, and truncated before; tail inflected; the third joint longest and pointed.

PYGMÆUS. Thorax smoothish, with five teeth each side; front very entire; middle joints of the hands one-toothed.

FASCICULARIS. Anterior part of the thorax tufted with hair; sides with two teeth. Herbft. Inhabits the East Indies.

RUFOPUNCTATUS. Thorax depressed, dotted with rufous; front six-toothed, sides two-toothed; hand-claws and legs smooth, dotted with rufous. Herbft.

General colour rich yellow, with innumerable rufous dots. Rather smaller than our common crab, C. mænas.

STRIGOSUS. Thorax smooth, streaked transversely on the sides; behind the eye a single tooth; snout deflected, with four tubercles before the tip. Herbft. &c. Larger than C. rufo-punctatus; prevailing colour brown; hand-claws short; legs long and broad. The claws at the extremity of all the legs appear in the figure by Herbft, rather cancellate, broad, and serrated, or fasciculated at the edges, from which it would seem rather to belong to the matuta genus than cancer.

LITTERATUS. Thorax impressed with the figure of letter H; sides three-toothed; claws compressed and ciliated. Fabr. &c.

A larger species than C. grapsus. Prevailing colour brown, darkest on the thorax.

PLICATUS. Thorax with an elevated longitudinal diverging plait in the middle; sides emarginate and dentated; hand-claws and legs smooth. Herbft.

Rather small; general colour pale brown; plaits on the back diverging into six rays.

TRISPINOSUS. Thorax unequal, front four-toothed, with three spines each side; hand-claws inflated, pincers blackish. Herbft.

CANCER.

This is a large species, the legs expanding about twelve inches; the thorax is nearly quadrangular, and moderate in size. Colour pale brown.

MARMARINUS. Thorax smooth, with a single lateral tooth, white with rufous spots; front three-lobed; middle one emarginate. Herbst.

Thorax rufous, elegantly charactered with whitish; legs pale yellow; hand claws with a large rufous spot on each joint.

MACULATUS. Thorax smooth, with a single lateral tooth, yellowish with rufous spots; front three-lobed, middle one emarginate. Herbst.

Except in colour, this differs very little from the preceding, and may possibly be only a variety of it.

AMPHITRITE. Thorax tuberculated, with four dilated teeth each side; front two-lobed; under surface of the hands and pincers fuscous.

Expands seven inches; general colour fine orange faintly spotted; legs varied, with indented fuscous marks. Perhaps a variety of floridus. Muf. Herbst.

DAIRA. Thorax, and upper surface of the hand-claws tuberculated; thorax broad, and narrowing anteriorly; sides crenated with teeth; front with two distinct tubercles.

Cancer Daria. Herbst. Length of the thorax an inch; hand-claws moderate; legs short and spinous. Inhabits the East Indies. Muf. Donovan.

DODONE. Thorax rather unequal; front obtuse, and two-lobed; sides compressed, somewhat emarginate, and toothed; hands and legs carinated; pincers black.

Size of the foregoing; thorax blue above; chelate arms and legs testaceous brown.

METIS. Thorax unequal, with smooth tubercles; front cleft, with two emarginated lobes; margin with five teeth each side. Herbst.

Smaller than C. dodone; colour pale; legs and arms moderate. Muf. Donovan.

PANOPE. Thorax convex, granulated; front obtuse, with granulated margin, and cleft in the middle; sides four-toothed; pincers of the fore-claws black brown.

Smaller than cancer mænas, and somewhat similar in figure; general colour olivaceous; upper surface of the hand-claws granulated and red. Herbst.

TYCHE. Thorax unequal, flat, tuberculated with granules; front advanced, obtusely rounded, and cleft; sides bidentated with two truncated warts; upper surface of the hand-claws tuberculated.

Cancer Tyche. Herbst. Smaller than the last, and of a dirty ash-colour; the tubercles on the hand-claws orange.

ELECTRA. Thorax unequal, and almost flat, tuberculated, and minutely granulated; sides five-toothed; front four-toothed; hand-claws granulated and dentated; pincers rounded; and blackish at the tips. Herbst.

PETRÆA. Thorax smooth, fuscous, with yellow spots; sides with a single tooth; front three-lobed. Herbst.

PITHO. Thorax smooth, and very glabrous; sides with a single tooth; front three-lobed, the middle one emarginate.

Length two inches; colour dusky olive. Herbst.

OCYROE. Thorax smooth, somewhat tuberculated, with fuscous ocellate dots; side with a single tooth; front slightly truncated, and furrowed in the middle. Herbst.

CYMODOCE. Thorax flat, depressed, nearly square, with a single spine on each side, somewhat truncated in front, and fix-toothed; inner margin of the arm dentated.

CALYPSO. Thorax convex, unequal, tuberculated, and granulated; sides three-toothed; front two-lobed, and granulated; hands granulated, and hispid; legs setaceous.

EURYNOME. Thorax flatish, tuberculated, and granulated; four jagged spines on each side; front with many teeth.

Size moderate, colour reddish brown, except on the legs, which are brown fasciated with whitish: arms and hands prickly; front of the thorax crenulated, with about thirty teeth. Cancer eurynome. Herbst.

POLYDORA. Thorax unequal, slightly convex, tuberculated, and warted; hands warted; pincers fuscous; legs tuberculated with spines.

PRINCEPS. Thorax elevated in front; sides emarginate; disk streaked transversely with series of sanguineous dots; legs banded with purple.

About the middle size; colour ochræous, dotted, and spotted with sanguineous. Herbst.

PARVULUS. Thorax three-toothed at each side, and marked with impressed lines above; front entire.

Very small. Inhabits the shores of the American islands.

PAGURUS. Thorax with nine obtuse plaits at each side; pincers of the hand-claw black at the tip.

This inhabits most of the rocky shores of England, and other countries of Europe, and is said to be in the highest perfection for the table about Christmas. The flesh is much esteemed, as being more palatable and wholesome than that of any other kind of crab.

UNDECIM-DENTATUS. Thorax nearly smooth, with eleven crenulate teeth at each side; proboscis three-toothed; fingers black at the tip.

A native of America. Thorax rather dilated behind, with crenated or rather serrated teeth at each side; legs and hand-claws somewhat hairy.

SPINIFRONS. Thorax five-toothed at each side; second and third tooth bifid; front and hands many-spined. Fabr.

AENEUS. Thorax very rugged, obtuse, and four-lobed at each side.

Inhabits India. The legs are compressed, varied with grey and rufous; lip doubled, and dotted with black; thighs with a black spot in the middle; hands small.

OCHTODES. Thorax unequal, obtusely toothed at each side; proboscis bifid; hands warty. Herbst.

Nearly the size of cancer mænas; pale flesh colour. Thorax with four, five, or six obtuse teeth at each side; arms and hands of the fore claw tuberculated.

LACTATUS. Thorax with four serrated lobes at each side; hands ovate and smooth. Herbst.

*** Section. *Thorax hairy, or spinous on the back.*

CHABRUS. Thorax hairy, suborbicular unarmed; hands ovate, and muricated. Linn. Inhabits the Indian Ocean.

SETOSUS. Hispid; thorax obcordate, and tuberculated; snout bifid and inflected.

Inhabits Chili. Described by Molin.

SANTOLLA. Thorax prickly, arched, subcoriaceous; hands covered with apellicle. Molin. Chili.

CRISTATUS. Thorax prickly; proboscis projecting; bifid, and crested; legs prickly. Rumpf.

GERMANUS. Thorax unequal, with a spine on the front, and another above the tail.

Inhabits the German Sea. The body is very minute; front with an ovate plate or lamina between the eyes, terminating in a spine; tail round, and consisting of five globular joints.

AURITUS. Thorax one-spined in front, with the back sulcated and softish.

A species of small size that inhabits Iceland. Shell with a small

CANCER.

a small erect spine behind the eyes; arms one-spined at the base and tip; thumb with a single tooth.

CRUENTATUS. Thorax tuberculated and red; snout linear and truncated. Scopoli.

Inhabits the Mediterranean. Body spotted with white at the tip; hands oblong, smooth, and armed with two teeth, legs warty.

HEPATIGUS. Thorax femicircular, gibbous, and warty; the margin serrated. Herbst. A native of America and India.

SCRUPOSUS. Thorax tuberculated and flattish; the margin prickly; hands crested at the inner margin.

Described by Herbst as an inhabitant of India.

Genus DORIPPE.

Antennæ four, the exterior ones setaceous, interior palpi-form; thorax somewhat heart-shaped and widest behind; hand-claws two, terminating in pincers; four posterior legs prehensile, and usually folded over the back.

LANATA. Thorax heart-shaped, unequal, depressed, hairy, and four-toothed in front; tail with six teeth at the base.

Cancer lanatus, Linn. Cancer quadridens. Fabr. Ent. Syst. Der. Wollenschild, Herbst. Inhabits India.

FACCHINO. Thorax smooth; margin very entire, with eight teeth in front. Der maulasse, Herbst. Pale brown, and twice the size of the following.

MASCARONE. Thorax smooth; margin very entire, with six teeth in front. Der mascarell, Herbst.

The two last mentioned species have the back of the thorax singularly indented with waved lines, that bear the resemblance of a grotesque human face; colour pale fuscous.

FRASONE. Thorax tuberculated, entire; anterior part lobed and dentated. Herbst.

Colour brownish; hand-claws and two posterior pair of legs hairy; first joint of the two anterior pair hairy, the rest naked.

ASTUTA. Thorax heart-shaped, depressed, and hairy; anterior part four-toothed; tail smooth. Fabr.

CALLIDA. Thorax heart-shaped, depressed, naked; front quadridentated; tail carinated. Fabr.

DROMIA. Thorax hairy, five-toothed each side: four posterior legs equal.

Dromia Rumphii. Fabr. Suppl. Cancer dromia. Linn. Cancer lanosus. Rumpf.

AEGAGROPILA. Thorax globular, unarmed, and very hirsute; pincers naked, and dentated within.

Dromia aegagropila. Fabr. Suppl.

ARTIFICIOSA. Thorax downy, depressed, three-toothed at each side; posterior legs large.

Dromia artificiosa. Fabr. Suppl. Inhabits the Indian Ocean.

Obs. There is reason to apprehend that several species of crabs described on the authority of naturalists in the genus cancer belong rather to this genus or family.

Genus PORTUNUS.

Antennæ four, unequal, small, and jointed; the exterior ones setaceous and longest, interior palpi-form; body large, short, and dentated at the edges. Legs ten, the posterior pair terminated in an ovate plate, or swimmer.

† Division. *Thorax bidentated at each side.*

VIGIL. Thorax smooth; arms spinous. This is a native of the Indian Ocean. Size moderate, eyes approximate, and situated upon very long peduncles; anterior tooth on the thorax much longer than the posterior one.

†† Division. *Thorax with four teeth at each side.*

PRYMNA. Thorax depressed and flat; front truncated and plaited. A small species of a pale brownish colour, thorax tinged with red.

††† Division. *Thorax with five teeth on each side.*

PUBER. Thorax heart shaped, and hairy; hands with a single tooth, and tipped with black.

Cancer Puber, Linn. Larger than cancer graptus, and inhabits the Mediterranean. Front with three obtuse crenated teeth; shells rugose of a brown colour with rufous hair.

FERIATUS. Thorax smooth; hands ovate, multangular, the second joint of the arms with a single tooth. Inhabits the Indian Sea. Cancer FERIATUS Linn.

DEPURATOR. Thorax smooth; hands compressed at the tip.

Cancer Depurator, Linn. Cancer Ramipes, Barrel.

LANCIFER. Thorax slightly tuberculated with a single spine on each side, and four teeth in front; anterior legs lineate.

Discovered in the Pacific Ocean. Mus. Banks. Thorax ovate, with six tubercles on the back; hands with spinous protuberances, the pincers toothed within; thighs of the first six legs toothed on the inner margin, the last joint but one with a sharp and long spine before the tip, the last lanceolate and acute; plate of the posterior legs roundish, obtuse, and ciliated.

HOLSATUS. Thorax smoothish, with five teeth in front between the eyes. Size and form of Depurator. Inhabits European seas. Mus. Daldorff.

RUMPHII. Thorax smoothish, with four tuberculate teeth in front; hand-claws smooth. Herbst.

LASSINASSA. Thorax unequal, attenuated behind; front advanced, and three toothed. Herbst.

VELUTINUS. Thorax three-lobed in front; velvety; hands granulated; legs velvety and furrowed.

Larger than Cancer mænas; colour brown. Mus. Donovan.

ADMETE. Thorax flat, with crenated transverse lines, and truncated in front; fourth lateral tooth smallest. Herbst.

Half the size of Cancer mænas, broad, pale brown; fingers of the hands black at the tip.

†††† Division. *Thorax with six teeth on each side.*

CRUCIFER. Thorax somewhat smooth; with eight teeth in front; last of the six lateral teeth emarginate.

Found in the Indian seas. Size large; frontal teeth obtuse; colour rufous with a cross in the middle, and lateral stripe white. Mus. Donovan.

LUCIFER. Thorax somewhat smooth; front with eight teeth; fingers rufous and black at the apex. Inhabits the Indian Ocean. Daldorff. Colour rufous or reddish with four large white spots. Shines by night.

ANNULATUS. Thorax smooth; front with eight teeth; legs annulated with violaceous.

Inhabits the Indian Ocean. Smaller than lucifer, smoothish, and dusky, hand-claws spinous, pincers red, a white band in the middle, end black with white tip. All the legs variegated with violaceous and white. Fabr. &c.

VARIEGATUS. Thorax heart-shaped, pubescent, back tooth of the thorax large; front with eight teeth; hands spinous. Fabr.

Bears a strong resemblance to the following species, but is smaller; and has the thorax rugose, the posterior spine longer, and the fingers white. Both are inhabitants of the Indian seas, and described from Daldorff's Museum.

HOLOSERICUS. Thorax heart-shaped, pubescent, front eight-toothed; hands spinous.

CANCER.

TRUNCATUS. Thorax heart-shaped, pubescent, truncated in front, and eight-toothed.

Nearly allied to the two former, but differs in having the thorax broader, truncated in front and all the teeth smaller and more obtuse.

FASCIATUS. Thorax in front eight-toothed; legs banded with purple; pincers scarlet. *Herbst.*

CALLIANASSA. Thorax six-toothed; hands spinous, and papillous at the angles. *Herbst.* Colour uniform dirty olivaceous brown.

+++++ Division. *Thorax with eight teeth on each side.*

MENESTHO. Thorax downy, truncated, and four-toothed in front, posterior lateral tooth large; arms of the fore-claws spinous. *Herbst.*

A large species; thorax above ochraceous brown, legs same paler.

+++++ Division. *Thorax with nine teeth on each side.*

TRANQUEBARICUS. Thorax smooth, with four teeth in front; arm dentated. *Fabr.*

A native of Tranquebar. This kind is eaten in the East Indies. The thorax is glabrous. *Mus. Daldorff.*

PELAGICUS. Thorax smooth; posterior tooth large; hands multangular.

Found among sea weeds. *Degzer.* Cancer pelagicus. *Linn.* Colour pale yellowish brown; fore-claws long, first joint spinous.

SANGUINOLENTUS. Thorax smooth; posterior tooth very large, and three sanguineous spots on the thorax. *Herbst.* *Der Blutfleck.*

Commonly confounded with pelagicus, but certainly a distinct species: it has three red spots on the back of the thorax, and one on each hand, by which it may be readily known. Pelagicus is smaller, the thorax more rounded; posterior spine slender, and outline very dissimilar.

DEFENSOR. Thorax smooth; posterior tooth short; front four-toothed, middle ones very short.

Cancer defensor. *Fabr. Ent. Syst.* Inhabits the South Seas. *Mus. Banks.*

HASTATUS. Thorax rugose; posterior tooth large: front four-toothed; teeth equal.

A native of America. *Mus. Pflug. and Mus. Donov.*

ARMIGER. Thorax somewhat smooth; posterior tooth large; front five-lobed: arms dentated on both sides.

Discovered in the South Seas. *Mus. Banks.* Cancer armiger. *Fabr. Ent. Syst.*

GLADIATOR. Thorax downy; posterior tooth large; hands spotted with sanguineous. *Daldorff.* Inhabits the Asiatic seas.

RETICULATUS. Yellow reticulated with green; thorax four-toothed in front; posterior lateral, tooth very long.

Cancer reticulatus. *Herbst.* Above the middle size; prevailing colour yellowish; fore-claws reticulated reddish, fingers red. This is a most elegant species.

FORCEPS. Thorax smooth; posterior lateral tooth largest; fingers very long and filiform. *Fabr. &c.*

Rather small, and entirely of a pale bluish green colour. *Herbst.*

PONTICUS. Thorax rugose; posterior lateral tooth large; hands filiform, fingers short. *Fabr.*

Smaller than cancer mænus; colour pale brown. *Mus. Donov.*

CEDO-NULI. Thorax smooth, punctured; posterior lateral tooth large; front dentated and emarginate, green with yellow spots; hand-claws elongated and multangular. *Herbst.*

This appears both in size and other particulars so nearly allied to portunus reticulatus, that they may be considered almost as varieties of the same species.

HASTATOIDES. Thorax downy; posterior tooth large with a single small tooth each side behind. Inhabits the Indian Ocean.

+++++ Division. *Thorax oblong-ovate, with three or more nearly equi-distant spines along each side.*

MAMMILLARIS. Thorax somewhat aculeated and obtuse, with a three-spined lobe in front; on each side a distinct rufous mammillated spot. *Mus. Donov.*

Fabricius constitutes a new genus of this species in his *Suppl. Ent.* under the name of orithyia. It is the only species of this genus known.

* Section. MATUTA.

Antennæ commonly four, the inner pair of four joints, with the last joint bifid, the two exterior short, and scarcely visible; the hand-claws armed with pincers; all the legs terminating in an ovate plate or swimmer.

VICTOR. Thorax dotted all over, lateral margin sub-dentated, the posterior tooth very large.

Cancer lunaris, *Rumpfius* and *Herbst.* Inhabits the coasts of Malabar. General colour yellowish. Size larger than *C. mænus*. *Mus. Donov.*

PLANIPES. Posterior part of the thorax striated. This inhabits the Indian Sea. *Mus. Daldorff.*

Genus CALAPPA.

Antennæ four, nearly equal; exterior ones setaceous; interior of four joints, the last bifid; body short, enlarged behind; margin much dilated, and concealing the legs when folded; legs eight, terminating in claws; hand-claws two, hands compressed, and armed with pincers.

FORNICATA. Thorax smooth, crenulated; posterior dilated, angles very entire; hands crested.

Inhabits the American Ocean. Cancer calappa of *Linn.* and *Fabr. Ent. Syst.*

TUBERCULATA. Thorax tuberculated, and many toothed, posterior dilated angle with crenated teeth; hands dentated.

Discovered in the Pacific Ocean. *Mus. Bank.* Cancer tuberculatus, *Fabr. Ent. Syst.* The thorax of this species is gibbous, with many tubercles and two impressed lines; snout short, obtuse, and somewhat reflected at the margins; legs simple, fingers striated, and red at the tip; second joint of the hands tuberculated and acute; hands tuberculated.

GRANULATA. Thorax somewhat smooth and crenated; posterior dilated margin five-toothed; hands crested.

Cancer granulatus, *Linn.* Inhabits the Mediterranean. This is a large species, of a pale yellowish, or cream colour, with several obtuse roundish tubercles, of a reddish colour, on the fore part of the thorax, and a few on the under side of the hands.

MARMORATA. Thorax somewhat plaited, with three teeth on each side; front crenated and emarginated; arms dilated and toothed at the tip.

LOPHOS. Thorax slightly plaited, and crenated on both sides; hind-margin dentated, and six toothed, the posterior angles dilated and five-toothed each.

Cancer lophos, *Mus. Herbst.* Inhabits the East Indies.

CRISTATA. Thorax slightly plaited, and crenated on both sides; hind-margin with seven teeth; dilated posterior angle with three-teeth; hands crested and toothed. Inhabits China. *Mus. Donov.*

ANGUSTATA. Thorax smooth, crenated on both sides with teeth, the posterior one narrow and smooth. Inhabits America. *Mus. Lund.*

GALLUS. Anterior half of the thorax tuberculated; both sides crenated and dentated; the posterior dilated angle six-toothed; hands tuberculated above. *Herbst.*

CANCER.

Genus LEUCOSIA.

Two or four antennæ, small, quadriarticulate, and inserted between the eyes. Body suborbicular, more or less convex, and generally inflated; tail naked; legs eight, and all furnished with claws; hand claws two, terminating in pincers.

Species.

Division † *with ovate hands.*

SCABRIUSCULA. Thorax depressed and scabrous, front emarginate.

The body of this species is small, depressed, and rough, with elevated whitish dots. This inhabits India.

GLOBOSA. Thorax slightly crenated; tail with two tubercles at the base; arms rough. Fabr. A curious species, discovered on the coast of Malabar by Dr. Koenig. Its size is small, figure somewhat globose; arms rough, hands filiform. Herbst describes it under the name of *Die kugelkrabbe*, Cancer globus.

CRANIOLARIS. Ovate, very glabrous, or polished; anterior part projecting, and armed with three teeth; hands two-edged and smooth. Linn. *Die Hirschaalkrabbe*, Herbst.

Body about the size of a small walnut, or rather less, the colour bluish, slightly tinged with faint red and purplish, the claws are of the same colour, except the pincers, which are pink; legs brownish. This inhabits the shores of Malabar. Mus. Donov.

PORCELLANUS. Thorax very glabrous, or polished, ovate, obtuse at the anterior part; arms granulated. Fabr. *Die porcellankrabbe*, Cancer porcellaneus, Herbst.

This species is about the same size as the preceding, and somewhat resembles it in form, but has the anterior part obtuse, and without teeth; the lateral margins of the thorax are granulated; general colour pale brown, with the two extreme joints of the hand-claws bluish. Inhabits Tranquebar. Mus. Donov.

PILA. Thorax globose, with a single obtuse elevated tooth in the middle, and the margin crenated with teeth.

Inhabits India. The body is small, globular; front obtuse; hand-claws short and smooth.

PLANETA. Thorax orbicular and flat; sides bidentated; front with three teeth.

This is a minute species, and inhabits Terra del Fuego.

URANIA. Globose, highly polished; anterior part projecting and roundish; arms warted, hands smooth. Herbst.

An elegant kind of crab, nearly allied to Cancer craniolaris in figure, but above twice the size. The body and hand-claws are olivaceous, with some obscure rufous spots: from the tip of the snout a broad white stripe descends nearly to the centre of the thorax, where it ends in a bifid termination. The pincers of the hand-claws, and all the legs are yellow spotted with ferruginous.

Division †† *with filiform hands.*

PUNCTATA. Thorax ovate, crenated, and three-toothed behind; fingers unarmed.

Inhabits America. Body large, ovate, and rough, with elevated dots; hand-claws long, filiform, and the arms granulated; hands elongated, fingers unarmed. Mus. Donov.

FUGAX. Thorax oblong, three-toothed behind; middle tooth longest and recurved; fingers dentated.

Frequently confounded with the preceding species, but is certainly distinct. Mus. Donov.

NUCLEUS. Thorax orbiculate, with two spines behind; arms granulated.

Cancer nucleus, Linn. Inhabits the Mediterranean. Mus. Donov.

SEPTESPINOSA. Thorax with an elongated and very acute spine on each side; five spines behind.

Cancer hytrix, Fabr. Ent. Syst. Inhabits the Indian Ocean.

CYLINDRICUS. Thorax with two furrows; sides dilated, cylindrical, and spinous at the tip.

Inhabits Tranquebar. This is of a small size; front obtuse, and grooved in the middle; thorax with two large grooves, and a transverse one on the fore part, all hairy; sides of the thorax whitish, with red dots, rough, and armed at the tip with a strong acute spine; tail whitish, and rough, with two longitudinal grooves in the middle; legs and arms very thin. Fabr. &c.

ERINACEUS. Thorax ovate and very spinous; marginal ones longest and dentated; arms prickly.

Described from the cabinet of Spengler, by Fabricius, as an inhabitant of the Indian Sea.

Genus OCYPODE.

Antennæ four (sometimes two), very short, and unequal; peduncles of the eyes lengthened, inserted in a central projection of the head, and extending along the front to the lateral angle of the thorax; body almost square; legs ten, armed with claws, the anterior pair, or arms, terminated in pincers.

CERATOPHTHALMA. Thorax dotted; eyes prominent, and terminated in a spine.

Cancer cursor, Linn. Cancer ceratophthalma, Fabr. Ent. Syst. and Pallas, and Cancer cursor of Herbst and Gmelin. This is a species of moderate size, being rather larger than Mænas, that inhabits the Mediterranean and Indian seas, from whence, about sun-set, it comes up the shores, and wanders about the strand, running at intervals with great velocity. The right claw is commonly larger than the other; both are scabrous, as also are the legs, though only in a slight degree. The general colour is brown.

Fabricius supposes the two species, Cursor and Uca, of Linnæus, to be both of this kind, the latter being only an accidental variety, in which the thorax is marked with a rude figure, somewhat resembling the letter H.

HETEROCHELOS. Thorax granulated; hand of one arm much larger than the other.

Cancer vocans, Linn. Cancer vocans major, Herbst. O. Heterochelos, La Marck. Inhabits Jamaica, where it conceals itself under stones, and when caught, emits a kind of cry. Size of our common crab, Cancer Mænas.

Obst. Herbst has the figure of another species nearly allied to the above; in form the same, but not above one fourth of the size. This he calls Cancer vocans major; perhaps the young, or a variety of the preceding, Cancer minor palustris, heterochelos of Plumier. M. S. G.

QUADRATA. Thorax smooth; crenated at the sides; hands scabrous. Inhabits Jamaica. Mus. Banks. Cancer quadratus, Fabr. Syst. Ent.

RHOMBOIDES. Thorax smooth; lateral angle armed with a spine in front. Cancer rhomboides, Linn. Das Würfelschild, Herbst.

Colour pale brownish; arms long, and shaded with rufous. Mus. Donov.

ANGULATUS. Thorax smooth; oblong, with two spines at the anterior part of the lateral angle. Cancer angulatus Linn. Ocypoda bispinosa, La Marck. Mus. Donov.

LEVIS. Thorax smooth, with a single tooth at each side; hand-claws very smooth, right hand largest. Inhabits the Indian Sea. Daldorff. Fabr. Suppl.

MINUTA. Thorax smooth, with a single tooth at each side; hand-claws very smooth and equal. Inhabits the isle of France. Mus. Daldorff, Fabr. Suppl.

BREVIS. Thorax short, plaited, with three teeth at each side; hand-claws long. Herbst. Suppl.

Moderately

CANCER.

Moderately small, colour in general pale brown. Muf. Donovan.

VOCATOR. Thorax rugose, anterior part sinuous; right hand very large. Herbst. Suppl.

Body somewhat gibbous at the sides, and narrowing rather behind; colour of the thorax; left hand-claw, and first joints of the legs dark red, the first variegated with black; largest claw, and extreme joints of the legs pale brownish. Muf. Donovan.

Genus MAJA.

Antennæ four, the interior ones palpiform, exterior setaceous; body oval and subconic, much enlarged behind, and narrowing towards a point in front; legs eight, armed with claws; hand-claws terminated in pincers.

Species.

* Section. PARTHENOPE, Fabr. *Arms of the chelate-claws usually very large.*

GIRAFFA. Thorax spinous, spines ramose; hand-claws very long and tuberculated beneath. Inhabits the East Indies. Muf. Daldorff.

LONGIMANA. Thorax spinous, spines simple; hand-claws very long and smooth beneath.

Cancer longimanus, Linn. A native of Asiatic seas. Muf. Donovan.

REGINA. Thorax unequal; margin spinous; hand-claws very long, with spinous angles. An inhabitant of the Indian seas.

HORRIDA. Thorax rugged with prickles and tubercles; hands large, tuberculated, and somewhat ovate; tail carious. Inhabits the Asiatic ocean. Called by *Rumphius* Rotkrabbe, Die Schreckliche, Herbst. Great warty Crab of *Petiver*. Muf. Donovan.

LAR. Thorax unequal, four toothed; margin spinous; hand-claws smooth. This is a native of the East Indies. Muf. Daldorff.

ERIOCHELES. Thorax aculeated, hands ventricose, and spinous; fingers tufted with hairs. Cancer Eriochelæ of Olivier.

Cancer maja, Linn. Parthenope maja, Fabr. Inhabits the northern parts of Europe, and England. Muf. Donovan. Mistaken by Pennant for Cancer Horridus. This is a large species.

DUBIA. Thorax smooth, three toothed in front; hands compressed, and ciliated; posterior legs very short and dorsal. Inhabits the Indian Sea.

MURICATA. Thorax hairy, unequal, with a dorsal line and two dorsal spines on each side; marginal spines four; legs hairy.

Cancer muricatus, Fabr. Ent. Syst.

CONTRARIUS. Thorax very unequal, tuberculated, and spinous, the front projecting and pointed; hand-claws muricated; legs simple, and banded with rufous. Herbst.

Body three inches in length, hand-claws six inches long and very large; colour pale brown in general, tips of the pincers of the fore-claws black.

ECHINATUS. Thorax heart-shaped, warted, aculeated; arms and hands of the chelate-claws echinated; legs muricated. Muf. Donovan.

* Section. INACHUS. Fabr. *Arms of the chelate-claws usually short or moderate.*

HYBRIDA. Thorax hairy, unequal, with a dorsal line, and two dorsal spines; marginal spines four; legs naked at the tip.

Inachus hyridus. Fabr. Suppl. Very much resembles the foregoing, but is distinct. Inhabits India.

OVIS. Thorax ovate, hairy, with four spines each side.

Cancer ovis Fabr. Ent. Syst. Inachus Ovis Suppl. Cancer hircus, Herbst. Inhabits the East Indies.

HIRCUS. Thorax woolly, tuberculated; arms muricated; hands smooth.

Cancer hircus, Fabr. Syst. Ent. Inachus hircus, Suppl. Inhabits Jamaica.

CORNUTA. Thorax prickly; snout with two horn-shaped bearded spines; hands rounded. Inhabits the Mediterranean sea. Cancer cornutus, Linn. Inachus cornutus, Fabr. Suppl.

ARANEUS. Thorax unequal; margin crenated on both sides; anterior part dilated and acute.

OPILIO. Thorax prickly; margin three-toothed behind; hands somewhat smooth.

In the cabinet of Prof. Vahl. Inhabits the Mediterranean.

CONDYLIATUS. Thorax ovate and prickly; three erect spines above the tail; hands muricated.

Size of Cancer Araneus or larger. Thorax unequal, many-spined; three large tubercles on the dorsal spine behind; thighs armed with a spine before the tip. Inhabits the Mediterranean.

ACULEATA. Thorax covered with prickles; snout long, bifid; five-toothed above, and one beneath. Inhabits the Norway seas. Muf. Vahl.

CHIAGRA. Thorax tuberculated, unequal; snout flat, retuse; legs tuberculated. Muf. Donovan.

A native of the Mediterranean. Inachus chiagra. Fabr. Suppl.

ANGUSTATA. Thorax attenuated in front, and smoothish; snout projecting, bearded, and emarginate at the apex. Inhabits the East Indies. Body minute; thorax smoothish with entire margin; legs spinous; hand-claws short, hands smoothish, the rest spinous.

SCORPIO. Thorax pubescent, with four erect spines; anterior legs very long.

Cancer Scorpio, Fabr. Ent. Syst. Inachus Scorpio, Fabr. Suppl. A native of the European seas, chiefly Norway, rarely England. Muf. Donovan.

PHALANGIUM. Thorax pubescent, with three acute spines on the anterior part, obtuse tubercles behind; snout bifid.

Common in Northern seas; frequent on the coast of England.

LONGIROSTRA. Thorax prickly, projecting, ascending, snout acute and bifid.

Cancer longirostris, Fabr. Ent. Syst. Cancer dodecos, Linn. A native of the Mediterranean and Northern seas.

LONGIPES. Thorax prickly; hands ovate and scabrous; posterior legs very long.

Cancer Longipes, Linn. A native of the Indian Ocean. Rumpf.

SETICORNIS. Thorax ovate, smooth, snout very long, and ferrated on both sides. Herbst.

PLANISSIMA. Thorax quite flat, and nearly square, with five teeth on each side, front trifid with spines; inner margin of the thighs, and first joint of the hand-claws dentated. Herbst.

HIRTICORNIS. Thorax heart-shaped, unequal, dentated; front with two long, approximate, hirsute spines.

Thorax about the size of a small walnut; legs moderate, chelate; claws nearly the same size as the anterior pair of legs, or rather less; the whole slightly spinous, somewhat hairy, and of a fuscous colour. Muf. Donovan.

DAMA. Thorax ovate, and granulated, with seven spines on each side; front with two ramose spines of three branches; arm and joint below the hands of the chelate claws very spinous. Herbst.

Length of the body three inches: legs, and chelate claws

C A N C E R.

claws moderate; thorax brown; hand claws pale brown; legs blackish. Muf. Donov.

CORNUDO. Thorax ovate, unequal, with four spines at each side; front four-spined, the interior pair very long. Herbf.

From three to four inches long: hand claws filiform, arms four-toothed: thorax palish, olivaceous: legs darker. Muf. Donov.

SQUINADO. Thorax obovate, unequal, prickly with lateral spines; front bifurcated; chelate claws moderate and filiform, arm and joint below the hand prickly; legs unarmed. Muf. Donov.

Cancer Squinado. Herbf. Inhabits European seas, and is a large species.

PHILYRA. Thorax subovate, granulated, and unequal; snout very large, broad, square, and four-toothed in front; hand-claws small and glabrous. Herbf.

Rather small, length one inch and a quarter, colour pale, legs faint yellow, spotted obscurely with reddish.

THALIA. Thorax ovate and granulated; sides spinous; front truncated, with two acute incurved spines; hand-claws very small.

Length almost two inches; prevailing colour ferruginous; hands black or blackish.

CERVICORNIS. Thorax somewhat ovate and tuberculated; anterior part much advanced, and armed with four long curved, horn-like spines.

PLEJONE. Thorax conic, tuberculated and spinous, with two long spines in front; hand-claws and legs unarmed. Herbf.

This is about an inch and a half in length; thorax pale brown, the two anterior spines approximate at the base, and curving a little to the sides upwards; legs pale fuscous, the first pair longer than the chelate claws.

STYX. Thorax ovate, subconic, warted, snout simple, and forked at the apex; anterior pair of legs thick, and hispid. Herbf.

Half the size of the former; hand claws very small; colour brown, palest on the thorax.

CRUSTACEOUS ANIMALS.

Second Order. *Canceri Macrouri.* Linn.

Head not distinct from the thorax: thorax oblong, with an elongated tail, furnished with lateral appendages or crochets.

Genus *ASTACUS.*

Antennæ pedunculated, unequal, the exterior ones long and setaceous, inner pair divided at the extremity; body elongated; legs commonly ten; tail foliaceous.

Species.

Section*. *Inner pair of antennæ two-cleft or bifid.*

GAMMARUS. Thorax smooth; proboscis toothed at the sides, with a double tooth on each side, at the base; hands smooth.

Cancer gammarus. Linn. *Astacus Marinus.* Fabr.

This is the common lobster, a species frequent in all the northern parts of Europe. It is most abundant with us in the northern extremity of Scotland, but is far more frequent than even there on the coast of Norway. In a general point of view we can add little to the history of the lobster beyond what has been already related by Mr. Pennant, upon the authority principally of Mr. Travis of Scarborough, and of which we shall avail ourselves in this place.

The lobster inhabits, says Mr. Pennant, all the rocky shores of our island, but chiefly where there is a depth of

water. In Llyn in Caernarvonshire, a certain small lobster, nothing different, except in size, burrows in the sand. In addition to this we must observe that the largest lobsters we have ever seen, some few from the coast of Scotland excepted, were taken in the lobster traps within a short distance of that part of Caernarvonshire mentioned by Mr. Pennant, and though so very large their flavour was delicious.

Lobsters are brought in vast quantities from the Orkney islands, and many parts of the eastern coasts of Scotland to the London markets; (but the metropolis is also well supplied with lobsters at most seasons of the year from the coast of Norway, and these latter are in more esteem for the table than the Scottish kind). Mr. Pennant mentions in his tour in Scotland, in 1772, that sixty or seventy thousand lobsters are annually brought to London from the neighbourhood of Montrose alone. Lobsters fear thunder, and are apt to cast their claws on a great clap; it is said they will do the same on the firing of a great gun, and that when men of war meet a lobster boat, a jocular threat is used, that if the master does not sell them good lobsters they will salute him. When irritated, or in fear, the lobsters frequently throw off their claws, and the same happens commonly when those poor animals are plunged into the boiling-pot for dressing. When first caught, if taken or entangled only by the claw, they will throw it off with a sudden jerk, and so effect their escape.

The habitation of this species, as Mr. Pennant tells us, is in the clearest water, at the foot of rocks that impend over the sea. This has given opportunity of examining more closely into the natural history of the animal than many others, who live in an element that prohibits most of the human researches, and limits the inquiries of the most inquisitive. Lobsters are found on most of the rocky coasts of Great Britain. Some are taken by the hand, but the greater quantity in pots, a sort of trap formed of twigs, and baited with garbage; they are formed like a wire mouse-trap, so that when the lobsters get in, there is no possibility of returning. These are fastened to a cord sunk into the sea, and their place marked by a buoy. They begin to breed in the spring, and continue breeding most part of the summer. They are highly prolific. Dr. Bafter says he counted 12,444 eggs under the tail of one female, besides those that remained in the body unprotruded. The eggs they deposit in the sand, where they are soon hatched. Lobsters change their shell annually like other crustaceous animals. Previous to their putting off their old one they appear sickly, languid, and restless. They totally acquire a new coat in a few days after casting off the former one. During the time that they remain defenceless they seek some very lonely place, for fear of being attacked and devoured by such of their brethren who are not in the same weak situation. The circumstance of the reproduction of the claws in lobsters, though surprising, is sufficiently well known: lobsters, as well as crabs, will renew their claws, if by accident they are torn off, within the space of a few weeks after the mischance has happened. They are very voracious animals, and feed on sea-weed, garbage, dead bodies, and similar filth.

Mr. Travis communicated some interesting particulars relative to the history of the lobster from a variety of observations made by himself on the coast of Scarborough. Lobsters, he observes, are found in vast numbers, and very fine, upon that coast. The larger ones are in general in their best season from the middle of October till the beginning of May. Many of the small ones, and some few of the larger sort, are good all the summer. They are, in general, from four to four inches and a half from the tip of the head to the

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the end of the back shell. Commonly the pincers of one of the lobster's large claws are furnished with knobs, and those of the other claw serrated; with the former it keeps firm hold of the stalks of submarine plants, and with the other it cuts and minces its food very dexterously. The knobbed or numb-claw, as the fishermen call it, is sometimes on the right, and sometimes on the left indifferently. It is more dangerous to be seized by them with the cutting claw than the other, but in either case the quickest way to get disengaged from the creature is to pluck off its claw: a new one will be produced in its place, though it will never attain the size of the former. The female, or hen lobster, does not cast her shell the same year that she deposits her ova, or in the common phrase, the berry. When the ova first appear under her tail, they are very small and extremely black, but they become in succession almost as large as ripe elder berries before they are deposited, and turn of a dark brown colour, especially towards the end of the time of her depositing them. They continue full, and depositing the ova in constant succession as long as the black substance can be found in their body, which, when boiled, turns of a beautiful red colour and is called the coral. Hen lobsters are found in berry at all times of the year. It is a common mistake that a berried hen is always in perfection for the table. When her berries appear large and brownish, she will always be found exhausted, watery, and poor. Though the ova be cast at all times of the year, they seem only to come to life during the warm summer months of July and August. Great numbers of them may then be found under the appearance of tadpoles swimming about the little pools left by the tides among the rocks, and many also under their proper form from half an inch to four inches in length.

In casting their shells, it is hard to conceive how the lobsters are able to draw the flesh of their large claws out, leaving the shell entire, and attached to their body; in which state they are constantly found. The fishermen say the lobsters pine before casting, till the flesh of its large claw is no thicker than the quill of a goose, which enables it to draw its parts through the joints and narrow passage near the trunk. The new shell is quite membranous at first, but hardens by degrees. Lobsters only grow in size while their shells are in their soft state. They are chosen for the table by their being heavy, in proportion to their size; and by the hardness of their shells on the sides, which when in perfection will not yield to moderate pressure. Barnacles and other small shell-fish adhering to them are esteemed certain indications of superior goodness. Cock lobsters are in general better than the hens in winter: they are distinguished by the narrowness of their tail, and by their having a strong spine upon the centre of each of the transverse processes beneath the tail, which support the four middle plates of the tails. The fish of the lobster's claw is more tender, delicate, and easy of digestion than that of the tail. The Scarborough fishermen do not take lobsters in pots as is usual in still and deep waters; they use a bag-net fixed to an iron hoop, about two feet in diameter, and suspended by three lines like a scale. The bait is commonly fish-guts tied to the bottom and middle of the net. They can take none in the day-time, except when the water is thick: they are commonly caught in the night, but even then it is not possible to take any when the sea has that luminous appearance which is supposed to proceed from the nereis noctiluca. In summer the lobsters are found near the shore, and thence to about six fathoms depth of water; and in winter they are seldom taken in less than twelve or fifteen fathoms. Like insects, they are much more active and alert in warm weather than in cold. In the water they can

run nimbly upon their legs, or small claws, and if alarmed, can spring, tail foremost, to a surprising distance as swift as a bird can fly. The fishermen can see them pass about thirty feet, and by the swiftness of their motions, suppose they may go much further. Athenæus remarks this circumstance, and says the incurvated lobsters will spring with the activity of dolphins. Their eyes are raised upon moveable bases, which enables them to see readily every way. When frightened, they will spring from a considerable distance to their hold in the rock; and, what is not less surprising than true, will throw themselves into their hold in that manner, through an entrance barely sufficient for their bodies to pass; as is frequently seen by the people who endeavour to take them at Filey bridge. In frosty weather, if any happen to be found near the shore, they are quite torpid and benumbed.

FLUVIATILIS. Thorax smooth; snout dentated and armed at the base with a single tooth on each side; hands scabrous.

Cancer astacus, Linn. The common craw-fish of English writers. This kind sometimes, though very rarely, attains the size of a moderately small lobster; more commonly they scarcely exceed a finger's length. They inhabit rivers, lodging themselves in holes, which they perforate in clayey banks. Colour olivaceous, or dark brown. Flesh good. Found in various parts of Europe.

SERRATUS. Hands serrated; tail mucronated on each side by a triple row of spinous protuberances. Zool. N. Holl. Inhabits New Holland.

NARVAL. Snout very long, ascending, compressed, and serrated on each side. Fabr.

A native of the Mediterranean. The tail consists of five leaves, the middle one of which is subulate.

CÆMENTARIUS. Thorax smooth, cylindrical; snout obtuse; hands aculeated. Molin. Chili.

Very common in the rivers of Chili. Length eight inches; colour fuscous, veined with red; flesh white and very good.

CÆRULESCENS. Bluish; thorax smooth; snout advanced, subulate, and bidentated. Fabr. Inhabits deep waters. Thorax with two small teeth at the base of the proboscis; first segment of the abdomen very large; middle leaf of the tail emarginate; legs filiform. Very frequent between the tropics.

FULGENS. Proboscis very short and subulate; legs simple. Fabr.

Body small, whitish, subdiaphanous; shines by night. Inhabits the sea round Brasil.

HOMARI. Segments of the body slightly spinous on the back; tail fasciculated, and armed with serrated styles. Fabr. Found on the coast of Norway.

FULVUS. Thorax smooth; proboscis short, serrated on both sides; hands compressed, and crenated on each side. Fabr.

HARENGUM. Snout subulate; eyes globose and prominent. Fabr.

This is the principal food of herrings and cod-fish, inhabiting the seas in prodigious numbers. The body is minute, white, and filiform. *Astacus halecun* of Gmelin.

CRASSICORNIS. Thorax articulated, the sixth pair of legs very long. Fabr. Inhabits the American seas. Thorax carinated on the back, and consisting of eight joints; the anterior part retuse and without proboscis; tail with six filiform styles. Colour reddish. Size of the common shrimp.

HISTRIO. Thorax armed at the margin with two teeth; snout lanceolate, and serrated; body variegated. Fabr. Inhabits Greenland. Size small.

PLANATUS.

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PLANATUS. Proboscis very short and subulate; hands very long, with a compressed carinated finger. Fabr. Brit. Mus.

Body smooth, pale, and without spots; hands flat, above reddish, beneath yellowish, with a single raised line; legs yellowish. Size of the common shrimp.

BOREAS. Thorax prickly, second and third pair of legs filiform. Fabr. Described in Phipps's voyage as an inhabitant of the North Sea. The proboscis is short, depressed, acute, grooved on both sides, with a strong tooth beneath.

CARINATUS. Thorax with a dentated keel; proboscis short, recurved, and furnished with three teeth at the tip. The native place of this species is unknown.

GROENLANDICUS. Anterior margin of the thorax and proboscis toothed; feelers spinous at the tip; body fuscous. Inhabits the Greenland seas. Snout advanced, with three teeth above and two beneath; exterior pair of antennæ very long, and variegated with red and white; anterior part of the margin of the thorax with three teeth, and back carinated with four; segments of the abdomen ending in a spine each side; middle leaf of the tail with two toothed lines.

VARIUS. Margin of the thorax with a single tooth; proboscis serrated on both sides; body variegated.

Described by Fabricius from a specimen taken in the Norway Ocean in the month of August. The exterior antennæ are longer than the body, rufous with four white spots. Thorax cylindrical, smooth, with a strong tooth above the eyes. Proboscis projecting, ascending, and serrated both above and beneath. Abdomen cinereous, with many oblique rufous bands; middle leaf of the tail subulate; second pair of legs filiform, and longer than the rest.

SCABER. Anterior part of the thorax scabrous; snout short, subulate; hands oblong and hairy. Fabr. Inhabits the Indian Ocean. Mus. Daldorff. Smaller than *Astacus norvegicus*.

Section. ** *Inner pair of antennæ three-cleft.*

JAMAICENSIS. Proboscis serrated above, beneath tridentated; arms and hands muricated, pincers with a strong spine on the inner edge. Sloane, &c. Inhabits Jamaica.

NORWEGICUS. Thorax spinous on the anterior part; hands prism-shaped, with spinous angles. Fabr. *Cancer norvegicus*. Linn. Found chiefly in the Norway sea, from whence its name.

PENNACEUS. Thorax smooth; proboscis projecting and serrated above, beneath smooth; fingers filiform.

This is smaller than the last. Margin of the thorax with a single tooth each side; hands short, ovate with linear acute fingers.

CRANGON. Thorax smooth; proboscis short, and very entire; hands with a single moveable fang. Inhabits most sandy shores of Europe. With us is known by the name of shrimp. Flesh delicate. This has only six legs; middle leaf of the tail subulate; colour pale-yellowish, semi-transparent and dotted.

TETIGONUS. Thorax spinous; four anterior legs filiform. Fabr. Inhabits Iceland.

*** Family PALÆMON.

Antennæ four; the interior short, trifid, with a scale, or plate at the base; the exterior very long and setaceous; body subcylindric; anterior feet terminating commonly in pincers.

CARCINUS. Hand-claws equal, projecting and muricated; proboscis ascending, and longer than the antennæ plates. Fabr.—*Locusta marina*. Rumpf. *Astacus fluviatilis major*, Sloane. Inhabits rivers of America.

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LONGIMANUS. Hand-claws advanced, unequal, smooth; snout straight, and of the same length as the antennæ plates.

Inhabits the East Indies. The thorax is smooth, with two teeth on each side at the anterior part; hands filiform, projecting, smooth, the left one much longest, legs smooth.

BREVIMANUS. Hand-claws of moderate length; fingers or pincers rather short; proboscis ascending, and longer than the antennæ plates.

A native of the East Indies. Mus. Daldorff.

Smaller than *longimanus*; snout compressed, and serrated on both sides; thorax smooth, glabrous, with two teeth on each side of the anterior part; hand-claws filiform, and rather longer than the legs, and smooth.

COROMANDELIANUS. Hand-claws of moderate length; pincers rather short; snout same length as the antennæ plates. From the coast of Coromandel. Very similar to the preceding, of which it may be only a variety; it differs principally in the proboscis, being shorter as well as the pincers.

TRANQUEBARICUS. Hand-claws long and filiform; hands ovate. Inhabits Tranquebar. Daldorff.

Snout ascending, rather longer than the antennæ plates, and serrated at the back; hand-claws as long as the body, filiform, very thin and smooth; hands thick; legs filiform and smooth.

LAR. Hand-claws projecting, equal, muricated; snout straight, and length of the antennæ scales.

Inhabits India. Fabr. Thorax smooth, with two acute teeth on each side; snout compressed and serrated; legs muricated.

SERRATUS. Thorax smooth and subcarinated; snout serrated on each side. Inhabits the Norway Sea. Vahl.

FUCORUM. Thorax smooth; snout ascending, with five teeth at the apex. Lives among fuci. Daldorff.

SCYLLA. Thorax smooth; proboscis serrated above, and three-toothed beneath; margin of the thorax with five teeth. Fabr.

The prawn. Inhabits European seas.

LOCUSTA. Thorax smooth; proboscis projecting, advanced, above serrated, beneath smooth; pincers elongated and filiform. *Astacus locusta*. Fabr. Ent. Syst. *Cancer locusta*. Linn.

**** Family. ALPHÆUS.

Antennæ four; the interior short and bifid; exterior long, simple, with a scale or plate at the first joint of the peduncle.

TAMULUS. Hand-claws unequal; the left hand small and filiform. Inhabits the Indian Ocean. Daldorff.

AVARUS. Hand-claws unequal; snout short and subulate. Inhabits India. Daldorff. The inner pair of antennæ blue; thorax smooth; snout sharp-pointed; four hand-claws, the anterior ones largest; right hand large and compressed; posterior pair very thin and filiform.

Obs. *Tamulus* and *avarus* are perhaps only varieties of the same species.

RAPAX. Hand-claws unequal; anterior part of the thorax carinated; snout subulate. Daldorff.

A native of the Indian Sea. Thorax smooth and glabrous; four hand-claws, the anterior pair of which has sometimes the right hand, sometimes the left hand largest.

MALABARICUS. Hand-claws unequal; right hand largest; legs filiform.

Inhabits the Indian Sea. Left hand longer than the right, (which is largest), and filiform.

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Genus

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Genus SCYLLARUS.

Antennæ four, unequal; inner pair rather long, filiform, with the last joint bifid; exterior ones depressed, flat, and dilated, and ciliated with spines; thorax large, and usually aculeated or rough; body long; tail with swimming appendages; legs ten; no cheliform arms.

Species.

ARCTUS. Five spines on the anterior part of the thorax; plates of the antennæ ciliated and aculeated.

Cancer arctus. Linn. Potiquiquix. Jonst. Umiktak. Müller. Urfa castrata. Belon. and Der Bärenkrebs of Herbst. This is an inhabitant of most seas. Its size is superior to that of the common lobster. The shells are tuberculated, of a brown colour, and spotted with yellow; legs spotted; thighs spinous. Muf. Donovan.

ÆQUINOCTIALIS. Scabrous; thorax and plates of the antennæ crenated. Brow. Jam. Fabr. &c.

ANTARCTIUS. Rough and pilose; thorax and plates of the antennæ ferrated and ciliated. A native of India. Fabr. Muf. Donovan.

ORIENTALIS. Scabrous; anterior part of the thorax at each side armed with three spines; eyes placed close to the foremost one. East Indies. Fabr. Muf. Donovan.

The thorax of this species, which is of the middle size, is rough, with three distinct elevated spines down the back; colour pale brown.

AUSTRALIS. Plates of the antennæ roundish and smooth. Fabr. Muf. Bankf.

Discovered in the South Seas. Its general figure somewhat resembles arctus, but is narrower; the thorax unequal, with crenated margin; claws simple.

Genus PALINURUS.

Antennæ four, unequal, pedunculate; peduncle jointed; interior pair short, setaceous, bifid, and unarmed; exterior very long, setaceous, and aculeated, or hispid; body elongated; legs ten, armed with claws destitute of pincers, and tufted with hair at their extremity.

Species.

HOMARUS. Thorax prickly on the anterior part with two horns in front; arms without hand-claws.—**Cancer homarus.** Linn. **Astacus homarus.** Fabr. Ent. Syst. &c. Larger than the common lobster.

ELEPHAS. Thorax muricate, with four horns on the anterior part; the middle ones larger and toothed.—**Palinurus quadricornis.** Fabr. Suppl. **Astacus elephas.** Ent. Syst.

POLYPHAGUS. Thorax very slightly spinous; legs marbled with blue. Herbst.

ORNATUS. Green, sides spotted with white, abdominal segments smoothish; nearly allied to homarus; shorter antennæ, and legs blue, banded with white.

Inhabits the Indian Sea. Fabr. &c. Probably a variety of polyphagus, and not sufficiently distinct from the following species, which is also introduced from Fabricius.

FASCIATUS. Greenish; abdominal segments with a white posterior band. Muf. Daldorff. Fabr. A native of the Indian Ocean.

Genus GALATHEA.

Antennæ four, unequal and pedunculate; inner ones short, filiform, of three joints, that at the extremity bifid: outer pair setaceous and long; body elongated; tail foliaceous; legs usually ten; arms chelate.

Species.

STRIGOSA. Thorax plaited on the fore part with ciliated

wrinkles; snout acute, with seven denticles. Fabr. **Cancer strigosus.** Linn.

Length from five to seven inches when full grown; colour brown; tips of the pincers of the fore-claws red. Inhabits Europe. Muf. Donovan.

RUGOSA. Thorax with ciliated wrinkles on the anterior part, and spinous; snout with three denticles; arms long and slender. **Galathea rugosa.** Fabr. **Cancer rugosus.** Gmel. **Cancer bamffius.** Penn.

Discovered by Mr. Cordiner on the coast of Bamff, Scotland. Muf. Donovan.

GREGARIA. Thorax with ciliated plates; snout with three denticles; anterior feelers very long. Fabr.

Much smaller than the two preceding. It is found in the sea round the coast of Patagonia, where it occurs sometimes in such vast shoals that the sea appears perfectly red, that being the prevailing colour of them when alive; it has a brown spot on the back; and the hand-claws are rough. Muf. Bankf.

AMPLECTENS. Thorax smooth; snout very short and emarginate; middle pair of legs very long.

The body of this kind is small, whitish, subdiaphanous, and dotted with red; thorax unarmed, roundish behind, and broad, and narrowing towards the front; four antennæ setaceous, and very long; abdomen of five segments; tail of five leaves, the middle one tongue-shaped.

This kind is highly luminous by night; it inhabits the Atlantic, near the coast of Brasil. Fabr. Muf. Bankf.

Genus HIPPA.

Antennæ sometimes two, and pedunculate; commonly four, unequal, and fringed with thick hairs; inner pair very short, and bifid; body oblong; tail with small lateral appendages at the joints next the base; legs usually ten, and destitute of pincers.

Species.

ADACTYLA. Thorax smooth, with very entire margin; tail inflected, the last joint long, subulate, and ciliated at each side; hand-claw without fangs. Inhabits the South seas. Bankian Cab. **Cancer Adactylus.** Gmel.

TESTUDINARIA. Thorax somewhat ovate, smooth, four-toothed in front, second pair of legs longest. Herbst. Muf.

EREMITUS. Tail inflected, last joint ovate. Fabr. Inhabits the Indian seas. **Manibus nullis, pedibus utrinque quinque natatoriis.** Linn.

DORSIPES. Thorax glabrous, truncated in front, and armed with seven teeth; hand-claws compressed, and furnished with a falcated thumb. Fabr. **Cancer dorsipes.** Linn.

This kind inhabits the Indian and Southern Oceans. Length of the body and tail about three inches. Thorax smooth, and of a whitish colour, the margins hairy and crenated; a small plait ciliated with denticles projects before the front. The outer feelers contain four joints, the first and second of which are long, crustaceous, compressed, and ciliated; tail thin; hand-claws rough above, beneath smooth, pincers very short.

SYMNISTA. Thorax truncated and ciliated in front; hand-claws heart-shaped. Inhabits India. **Cancer symnista** of Linnæus.

SCABRA. Thorax ovate, truncated before, and armed with many teeth; hand-claws compressed, and toothed at each side. A native of the South Seas. Muf. Bankf.

The thorax of this species is large, ovate, and rough, with elevated oblong dots, sides crenated; tail very short, inflected and ciliated; hand-claws incurvated, hands large and rough, with

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with two teeth on the superior margin, and five on the lower one: legs eight, compressed, and ciliated, the extreme joint ovate-lanceolate. Fabr. &c.

DENTATA. Thorax smooth, with five teeth on each side; tarsi spinous. Fabr. Inhabits European seas.

Moderate size, glossy, pale colour, with a tooth on each side, behind the eye, three in the middle, and one behind; arms twice the length of the body, and somewhat spinous.

SCUTELLATA. Thorax nearly entire and ciliated; hands chelate. Fabr.

Described by Fabricius, from a specimen in the British museum. Native place unknown. It is small, with ovate thorax, rounded in front, and becoming narrower behind; hands smooth.

Gmelin adds to the above species, *Cancharus* of Linn. and *Sinicus* of Herbst, but expresses doubt whether they are of this family or genus.

CANCHARUS has the thorax rugose, oval, hands compressed, and spinous at the margin. Linn. Inhabits South America and India.

SINICUS. Thorax somewhat compressed, oval, and spinous; arms and legs spinous. Herbst. A native of China.

* Section SYMETHIS.

Antennæ two, very short, and containing four joints each.

VARIOLOSA. Thorax variolous, and toothed in front; legs furrowed at the tip. Fabr. Ent. Syst. Inhabits the Indian Ocean.

This species, arranged in the former works of Fabricius in the genus *Hippa*, forms a new genus, of which it is the only species in *Supplementum Ent. Syst.* under the name of *Symethis*, Fabricius having found that instead of four antennæ it possesses only two, and those different in structure from *Hippa*. His genus *Symethis* is thus described: antennæ duæ brevissimæ, quadriarticulatæ, intra rostrum binulæ reconditæ. Perhaps it ought rather to form a new genus than section of *Hippa*, in the present arrangement. It is of the middle size; snout short and seven-toothed; anterior part of the thorax with unequal impressed dots and obtuse teeth, smooth behind, with lateral rugosities; hands smooth; legs elongated, ciliated, and hooked at the tip. Mus. Spengler.

Obf. Fabricius in *Supplementum Ent.* refers five of the above described species to his new genus *albunea*; *symnista*, *scutellata*, *dorsipes*, *scabra*, and *dentata*.

Genus RANINA.

Antennæ four, short; the two inner ones bifid at the extreme joint; body oblong, wedge-shaped, truncated in front; tail small, and ciliated at the edges; legs eight, the four posterior ones terminating in swimmers; hand-claws two, armed with pincers.

Species.

SERRATA. *Cancer raninus*, Linn.? *Ranina ferrata*, La Marck.

The thorax of this crab is aculeated, or covered with prickles; colour fuscous; hairs that fringe the legs and tail yellowish brown. Inhabits the Indian seas. Rumpf. and Herbst.

Genus SQUILLA.

Antennæ four, nearly equal, and pedunculate; interior pair rather long and trifid, the exterior ones with an oblong plate; thorax short; tail very long, and enlarging towards the posterior extremity; legs fourteen.

Species.

MACULATA. Hands with a single ten-dentated fang;

body very smooth; tail five-toothed on each side. Fabr. Suppl.

MANTIS. Hands with a single six-dentated fang, subangulated; tail serrated and spinous. Fabr. Suppl. *Cancer mantis*, Linn.

Inhabits chiefly the Mediterranean and Asiatic seas. Is eaten by the Italians and the Chinese. Length about five or six inches.

RAPHIDEA. Hands with a single eight-dentated fang; body with two elevated lines on each side.

Very similar to *Squilla mantis*. Found in the Indian Ocean. Mus. Daldorff.

PHALANGIUM. Hands with a single five-dentated fang, the first and third tooth of which are longest; body smooth. Inhabits the East Indian seas. Body smaller than *S. mantis*, smooth, glabrous; last segment serrated with spines. Mus. Daldorff.

ICHNEUMON. Hands with a single four-dentated fang; margin of the tail ciliated, with thick spinous protuberances. From the East Indies. Mus. Daldorff. Smaller than *S. phalangium*; body with three elevated lines on both sides.

SCYLLARUS. Hands with a single straight, ventricose, angular, three-toothed fang. Inhabits Asia. Fabr. *Cancer scyllarus*, Linn.

CILIATA. Hands with a single three-toothed fang; two extreme joints of the abdomen ciliated with spines. Inhabits the Indian seas. Spengler.

CHIAGRA. Hands with a single fang, subulate, with a rufous protuberance at the base. Fabr. *Squilla arenaria* of Rumphius. This is a native of the South Sea. Mus. Banks.

VITREA. Thorax smooth, carinated with subulate angles; hands with a single subulate unarmed fang. Found in the Atlantic Ocean. Mus. Banks.

Genus PAGURUS.

Antennæ four, unequal, the inner ones short and bifid at the summit, the exterior setaceous, and usually longest; body oblong, thorax crustaceous; abdomen vesicular, naked, soft, and furnished at the tip with hooks or claws.

The species of this genus are mostly parasitical, and inhabit the empty cavities of turbinated shells, the animals of which they attack and devour to gain possession of their shell, and it is chiefly on the testaceous mollusca, or *shell fish*, that they subsist. They change their habitation as they increase in growth, first occupying the shells of the common periwinkle, or trochus, then perhaps a nerit as large as a walnut, and after that a whelk. But the paguri of climates warmer than those of Europe are often larger than with us, and require shells of considerable size for their habitation. The tail is naked and tender, being covered only with a skin of very delicate texture, but it is furnished at the extremity with one or more hooks, by means of which it secures itself to the shell which it makes choice of. It is astonishing with what facility those animals crawl both in the water and on the strand, bearing at the same time the shell that serves them as a covering on their back. They are indiscriminately called soldier-crabs and hermit-crabs, from the idea of their living in a tent, or retiring into a cell.

Species.

LATRO. Thorax at the suture four-cleft; tail simple and ventricose beneath. Linn. Bouverfiers, Rochef. &c. A native of the East Indies. Inhabits the holes and cavities of rocks, from whence it wanders abroad in the night-time in search of cocoa nuts, which it procures by climbing up the trees, and throwing them down, then descending after them, and tearing them open with the two fore-claws.

CANCER.

The Indians eat the flesh of this kind of hermit-crab after taking out the entrails, which they think poisonous.

MILES. Parasitic. Left hand largest, and mucicated on each side; legs with very long serrated claws. *Herbst.* Fabr.

A species of large size. Inhabits the East Indies.

CUSTOS. Parasitic. Left hand-claw largest; hand smooth; legs with very long smooth claws. Fabr.

A native of the East Indies, described in *Suppl. Fabr.* from the Museum of Daldorff; much resembles *Miles*, but is distinct.

DIAPHANUS. Parasitic. Depressed; left hand largest and smoothish; joint below dilated on the back. Inhabits the Indian sea.

ANICULUS. Parasitic. Thorax ovate, ciliated at the sides; legs rugged, and hairy. Fabr. Described from the Bankian cabinet. Inhabits the South Seas.

BERNHARDUS. Parasitic. Hand-claws mucicated, the right one largest. Linn. An European kind.

HUNGARUS. Parasitic. Hands hairy and tipped with black, the right one largest, body banded with red. *Herbst.*

A native of India. Smaller than *Pagurus Diogenes*. Peduncle of the eyes pale with red bands; body smooth; legs and hands hirsute.

CLYPEATUS. Parasitic. Thorax smooth, very entire and compressed; left hand largest, and with the legs dotted. Fabr.

Body small, compressed, whitish. Antennæ fuscous; hands white, with purple dots, and a marginal blue spot. Legs white with innumerable dots and specklings of purple.

DIODENES. Parasitic. Hands mucicated, pubescent; left hand largest. Fabr. *Suppl. &c.*

Called by Kaempfer, Gami na al Koon, and Modderman of Rumphius. Inhabits American and Indian seas. This, like most of its genus, inhabits empty shells; the general colour is pale testaceous or yellowish brown.

TUBULARIS. Parasitic. Subcylindrical: shell with excavated dots. Fabr.

Cancer tubularis, Linn. Inhabits the shells of *Serpula glomerata* in the Mediterranean.

OCULATUS. Parasitic. Hand-claws mucicated, equal; peduncles of the eyes as long as the thorax. Fabr.

Found chiefly in the shells of *Murex Brandaris*. Size of *Bernhardus*, our common hermit crab. Body entirely ferruginous; peduncles of the eyes advanced or projecting, cylindrical, with a tooth at the base. Arms with a sanguineous spot on each side; hand-claws rough.

ALATUS. Parasitic. Hands smooth, with three wing-like projections; right hand largest. Fabr. Inhabits Iceland. Dr. Koenig. Rather smaller than *Bernhardus*; joint below the hands rough; wing-like projections acute.

OPHTHALMICUS. Parasitic. Hands equal, mucicated; legs fasciculated with hairs; eyes clavate. Inhabits the Indian Ocean. Daldorff. Eyes large, and placed on short peduncles, at the base a small acute scale; hands short, equal, mucicated, with hairs, rufous. Perhaps *Cancer Clibanarius* of *Herbst.*

ARANEIFORMIS. Parasitic. Hands rough; tail callous at the tip, and furnished with a hooked tip. Fabr.

SCLOPETARIUS. Parasitic. Thorax smooth, entire; hands equal, granulated, thighs of the second pair of legs compressed. *Herbst.* Der Musketier.

This is about half the size of *Pagurus Bernhardus*; colour pale brown, with a blue streak down the middle of the two anterior pair of legs, and peduncles of the eyes of the same colour.

TYMPANISTA. Parasitic. Thorax smooth, very entire;

legs striated; claws marbled. Der Trommelschläger. *Herbst.* Smaller than the foregoing; hands linear.

TIBICEN. Parasitic. Thorax smooth, and very entire; left hand-claw largest; hands and legs chestnut, whitish at the tip.

EXCAVATUS. Parasitic. Right hand largest, with two excavations, and another similar on the moveable pincer. Der Aufgehöhlte. *Herbst.*

SCÆVOLA. Parasitic. Hands mucicated, left one largest, whitish; inner sides bearded; eyes obliquely wedged, pedicle compressed. *Forskäl, &c.*

LAGOPODES. Parasitic. Cinereous brown; legs rough with hirsuties; left hand largest. *Forskäl.*

DUBIUS. Parasitic. Hands somewhat glabrous; that on the left side smallest. *Herbst.* Mus. *Donov.*

CANALICULATUS. Parasitic. Hands and joint below grooved, with elevated denticulate margin; legs with hairy tufts. *Cancer canaliculatus. Herbst.*

MEGISTOS. Rufous with roundish white spots; hands and legs spinous, and hirsute. *Herbst.*

A beautiful species, legs and claws vermilion; thorax paler and body inclining to purple, and sprinkled all over with distinct roundish white spots; last segment of the abdomen and base of the tail red, but the tail itself brown and immaculate. Size of a moderately small lobster, or rather less.

STRIGATUS. Parasitic. Thorax rather flat, and whitish; hands and legs rufous, with transverse streaks. *Herbst.* Mus. Found in a volute. Smaller than *Pagurus Bernhardus*.

PEDUNCULATUS. Parasitic. Thorax flat, depressed; peduncles of the eyes thick; left hand largest, inflated, and mucicated. *Herbst.* Mus. *Donov.*

General colour pale ferruginous; abdomen cinereous, marked with pale, yellowish at the tip; two posterior pair of legs pale.

ARROSOR. Parasitic. Thorax flat; hands and legs with numerous transverse, irregular furrows. *Cancer Arrozor, Herbst.*

CRUSTACEOUS ANIMALS.

Third order, *Crustaceæ sessilicollæ*, La Marck.

Heads generally distinct from the thorax; eyes fixed and sessile; body long, and covered with many plates.

Genus GAMMARUS.

Antennæ four, very simple and pedunculate; anterior ones short and subulate; posterior setaceous. Head distinct, body small, oblong, compressed, linear, of many joints. Tail with many styles; legs numerous.

Species.

AMPULLA. Hands without fangs; legs fourteen; posterior thighs compressed and dilated. Inhabits the North Seas. Phipps.

CARINATUS. Hands without fangs; legs fourteen; back carinated, and spinous. Fabr.

Larger than *Gammarus Locusta*; body whitish, somewhat compressed, back carinated; segments somewhat spinous behind. Mus. Brit.

NUGAX. Hands without fangs; legs fourteen; six posterior thighs compressed and dilated. Inhabits the North Seas. Phipps Voy.

CANCELLUS. Hands without fangs; legs sixteen. Inhabits rivers of Siberia. Oniscus cancellus of Pallas.

LONGICORNIS. Hands without fangs; antennæ longer than the body; tail obtuse. Fabr. *Cancer grossipes*, Linn. Oniscus volutator, Pallas. *Cancer linearis*, Penn.

LOCUSTA. Hands four, without fangs; legs fourteen, thighs

thighs simple ; tail with bifid spines. Inhabits sandy shores of Europe.

PULEX. Hands four, without fangs ; legs ten. Fabr. *Cancer pulex*, Linn. *Pulex fluviatilis*, Ray. Very common in rivers, rivulets, and fountains. Supposed to be luminous at times by night. Swims in an incurvated posture.

CORNIGER. Hands without fangs ; proboscis incurvated and subulate ; sides of the thorax with a double horn. Inhabits the Norway seas. The body consists of eleven short segments, whitish, edged with red.

LINEARIS. Hands four with a single fang ; legs ten.

Cancer linearis, Linn. *Oniscus scolopendroides*, Pallas.

SALINUS. Legs twenty, spreading ; tail subulate. Matty.

STAGNALIS. Hands without fangs ; legs twenty-two ; tail cylindrical and bifid. Linn. Transf.

GIBBOSUS. Oblong, gibbous ; antennæ folded, and very long. Inhabits Portugal.

Body small, smooth, glabrous, yellowish sprinkled with dots of fuscous. Head thick, obtuse, with a large green spot ; eyes large. Antennæ setaceous, and bent under the body, folded, and three times the length of the body ; tail consisting of three acuminate leaves.

ESCA. Hands without fangs ; tail jointed, subulate, and cleft at the tip. Size of *Gammarus pulex*. Inhabits the Norway Sea, and is the principal food of herrings. Body blackish ; head somewhat hyaline ; tail nearly as long as the body.

MEDUSARUM. Hands four with a single fang ; head very obtuse. Inhabits Northern seas, and often found adhering to Medusæ. Ström.

PODURUS. Body containing twelve joints ; hands four without fangs ; legs eight ; two last joints of the body and the tail spinous. Müller.

MUTILUS. Arms four, second pair chelate ; legs eight ; body of ten joints. Müller.

ARENARIUS. Anterior part flattish ; posterior carinated, and somewhat ferrated ; four anterior legs cheliform and smooth ; antennæ nearly equal. Afta Halfn.

SPINICARPUS. Four anterior legs cheliform, the joint below the hand produced into an incurvated acute spine. Zool. Dan.

VENTRICOSUS. Inflated in the middle, flattish, and red ; legs fourteen ; setaceous, the second pair clavate, Müller. Much resembling the larva of a mantis. Length half an inch.

CANCHARUS, in *Entomology*, a species of **CANCER**, (*Hippa* Fabr.) described by Linnæus as a native of South America and India, the thorax of which is oval and rugged, with the hand-claws compressed, and spinous at the margin.

CANCHE, in *Geography*, a river of France, which runs into the sea, near Etaples, in the department of the Straits of Calais.

CANCHY, a town of France, in the department of the Somme ; 5 miles N. of Abbeville.—Also, a town in the department of the Calvados ; 10 miles W. of Bayeux.

CANCON, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the district of Villeneuve-d'Agen, 2 leagues W. of Montflanquin. The place contains 1425, and the canton 8506 inhabitants ; the territory includes 162½ kilometres, and 11 communes.

CANCRIFORMIS, in *Entomology*, a species of **CERAMBYX**, found in South America. The thorax is armed with many teeth ; back flat ; wing-cases and anterior flanks with a single tooth. Fabricius. Obs. This is *cerambyx pustulatus* of Drury's illustrations.

CANCERINE verses, in *Poetry*, denote the same with *retrograde* ; which see.

CANCERINUS of Rumphius, in *Entomology*, synonymous with **CANCER CURSOR**. See **CURSOR**.

CANCERIZANS, Lat. **CANCERIZANTE**, Ital. terms in *Music* for a canon, in which one of the parts moves like a crab-fish, backwards : as when two parts begin together at different ends of the movement in the same melody, passing each other till they arrive at the several ends ; then turning back and ending where they began.

CANCROMA, in *Ornithology*, a curious genus of birds, called in England the boat-bill. The structure of its bill is very extraordinary, and has been not inaptly compared to an inverted boat, whence its name ; it is also gibbous, or swollen ; nostrils small, placed in a furrow ; tongue small ; toes divided.

Two species only of this genus have been hitherto discovered, namely, *cochlearia* and *cancrophaga*, which see.

CANCROPHAGA, a species of **CANCROMA**, with a whitish belly. This is the *cochlearius fuscus* of Briss. the *tamatia* of Marcgrave, Ray, &c. and *cullier brune* of Buffon.

CANCZUCA, in *Geography*, a town of Poland, in the palatinate of Lemberg ; 36 miles W. of Lemberg.

CANDA, a town of Italy, belonging to the state of Venice, in the Polesin de Rovigno ; 14 miles W.S.W. of Rovigno.—Also, a river of England, which runs into the Eden at Carlisle.

CANDABORA, in *Ancient Geography*, a town of Spain belonging to the Celtiberians. Ptolemy.

CANDAHAR, or **KANDAKAR**, in *Geography*, a country of Asia, being part of the ancient *Paropamisus*, and situate between the two powerful kingdoms of Hindoostan and Persia, became alternately a province of the Mogul empire and of Persia, till it was again formed into an independent kingdom, as it had formerly been, by Ahmed Shah, one of the Afghan tribe of Abdalli, who, from an obscure origin, rose progressively in the service of Nadir Shah, or Kuli Khan, to the rank of an Afghan prince. Nadir stripped him of his country, and compelled him to join his army in 1739. On the death of Nadir he suddenly appeared among his former subjects, and in a short time erected for himself a considerable kingdom in the eastern part of Persia ; adding to it most of the Indian provinces ceded by the mogul to Nadir Shah. He died about the year 1773, and was succeeded by Timur Shah, usually styled king of Candahar, whose subjects, in 1783, are said to have lived under an easy government, considered as an Asiatic one. At this time the military force of Candahar was estimated at 200,000 men. His predecessor Ahmed Abdalla had regular infantry, clothed like the British sepoy, and, at one time, made use of the British manufactures for this purpose. The trade went by Sind, and up the Indus and its branches, to Cabul ; but it has been long at an end. The successor of Timur was Zemaun, whose chief subjects are Afghans, or the people of the mountains between Persia and Hindoostan, who may be considered as the founders of the empire ; the others are Hindoos, Persians, and a few Tartars. Candahar is bounded on the north by the Gaur and the province of Balk ; on the east by Cabul and the river Indus ; on the west by Segestan, and on the south by Arrhokage, Mekran, Sewee, and Moultan. Besides Candahar Proper, this empire in its greater extent includes Cabulistan, Ghizni, Cashmire, part of Segestan and part of Chorasan. See **CABUL**. Every part of it is mountainous except that which lies towards Persia. The chief city is Candahar.

CANDAHAR, a city of Candahar, the kingdom above-mentioned, is ascribed by M. d'Anville and others to Persia. While the Persian and Mogul empires were severally undivided, this was the frontier city and fortress of Hindoostan towards

towards Persia, and was esteemed the key of the western provinces of the latter, and not unfrequently changed masters. As Cabul was considered in a political light as the gate of India towards Tartary, Candahar held the same rank with regard to Persia; and hence it has derived its chief importance. Major Rennell has shewn that Candahar cannot be the same place, as some have supposed, with the Paromisan Alexandria of Alexander. This city, says Forster, in his "Journey from Bengal to England," comprised within an ordinary fortification of about three miles in circumference, and of a square form, is populous and flourishing; and lying in the great road which connects India with Persia and Tartary, it has been long a distinguished mart. It is abundantly supplied with provisions; the fruits are of an excellent quality; and the extensive range of shops occupied by Hindoo traders attests the liberty and protection which they enjoy at Candahar. The tract of territory dependent upon it is said to produce a revenue of 13 lacs of rupees; and from the appearance of all classes of people, the collection seems to be made without any extraordinary rigour. The environs of Candahar occupy an extensive plain, covered with fruit gardens and cultivation, and interspersed with numerous streams of so excellent a quality as to become proverbial; and the climate is happily tempered between the heat of India and the cold of Ghizni. To the west there is a considerable desert, extending nearly to Herat, which renders the passage from Persia to Hindoostan difficult. Between the mountains of Hindoo-Kho, and those of Candahar, the country assumes the form of an extensive valley, from Cabul to the borders of Chorasana; and in the tract between Cabul and Candahar, the highest point of elevation of the country is marked by the descent of the waters from it in almost every direction. The distance from Candahar by Cabul to Agra is 1208 miles; to Benares, 1588; to Calcutta by Moorshedabad, 2152; by Birboom, 2047; and to Delhi by Cabul, 1071. N. lat. 33°. E. long. 65° 33'.

CANDAIL, a town of Persia, in the province of Mekran; 148 miles E. of Kidge.

CANDANA, in *Ancient Geography*, a town of Asia, in Paphlagonia.

CANDASA, a town of Asia Minor, in Caria. Polybius.

CANDAU, in *Geography*, a town of the duchy of Courland; 24 miles E. of Goldingen.

CANDAVIA, in *Ancient Geography*, a county of Macedonia, mentioned by Cæsar and also by Seneca, which lay at some distance E. of Dyrrachium. It was bounded towards the east by the Candavian mountains, from which flowed the river Panyasus. These are supposed to be the "Cambavii montes" of Livy, and the "Canaluvii montes" of Ptolemy.

CANDE', in *Geography*, a town of France in the department of the Maine and Loire, and chief place of a canton, in the district of Segré, ten miles S.W. of Segré. The place contains 948, and the canton 6,343 inhabitants; the territory includes 285 kilometres and 6 communes.

CANDEISH, a province of the southern part of Hindoostan, in the territory of the Poonah, or western Maharrattas, being one of the three soubahs formed by Acbar in the 16th century out of the conquests in the Deccan. It occupies the space between Malwa on the north, Berar on the east, and Amednagur on the west and south. Its soil is fertile, though mountainous, and it produces more cotton than any other province of Hindoostan. The revenue of this province under Aurungzebe, as stated by Mr. Frazer in his "Life of Nadir Shah," amounted to 112 lacs of rupees. The principal town is Burhanpour, which see.

CANDEL, and **CANDELA**, in *Botany*. See RHIZOPHORA.

CANDEL, in *Geography*, a town of France, in the department of the Lower Rhine, and chief place of a canton in the district of Wissembourg; the place contains 2366, and the canton 13,424 inhabitants; its territorial extent comprehends 187½ kilometres, and 16 communes.

CANDELA, a town of Naples, in the province of Capitanata; two miles S.W. of Ascoli.

CANDELABRUM, in *Architectura*. This term, adopted from the Latin, is employed to denote the stands or supports, in common use among the ancients, to place their lamps upon; or which were hollowed out in the upper part, in the form of a brasier or bason, for the combustion of inflammable substances.

Candelabra are among the elegant and ornamental remains of antiquity, and curious, as they preserve the remembrance of primitive customs. The most ancient method of illuminating apartments during the night was apparently by burning dry and resinous wood, either in brasiers, or more simply, by single branches like flambeaux: the use of oil and of lamps succeeded to these imperfect and inconvenient methods, and candelabra served to support the lamps.

In treating of Candelabra they are to be divided into the two general classes already intimated; those which terminate in brasiers constitute the first, and those which served as lamp stands, the second.

In the first class are comprehended the most remarkable for size and magnificence; some of these, which by their destination resemble altars, and may even be confounded with them, were employed in temples and private chapels for burning incense. Cicero informs us, that not a house in Sicily was without these sacred utensils, made of silver. Candelabra of this kind are not unfrequently found represented in basso relievos and on the friezes of temples.

Very large marble candelabra are found at Rome, where, as Winckelmann observes, not one of bronze has been discovered; these from their great size and elevation correspond to the vast halls of Roman edifices, which they illuminated.

The marble candelabra vary greatly in the shape, both of the brasier, and of the body or pillar which supports it; and many of them present models of taste, in form, ornament, and execution. The richest collection of these objects is published in the *Museum Vaticanum*: two among these, which were found in the Barberini palace, are distinguished as exquisite specimens of ornamental workmanship; the base is a triangular altar, having each face ornamented with a figure of a divinity; the shaft is composed of acanthus leaves disposed in tiers in the style of a Corinthian capital, so that one of these candelabra appears, at first sight, a union of three Corinthian capitals placed upon one another; the other, which is the most beautiful, is varied in form by a tuft of acanthus leaves, which fall over like a canopy with a wonderful richness of appearance. The bason of both is fluted, and by its form and ornaments corresponds with the magnificence of the whole.

Our own country possesses many ancient candelabra, two of admirable workmanship were presented to the Radcliffe library at Oxford, by Sir Roger Newdigate; they were found in the ruins of the emperor Adrian's palace at Tivoli.

Of the second class of candelabra there is a very curious collection in the museum of Portici, which were found in the excavations of Herculaneum and Pompeii. They are all of bronze, and were used for domestic purposes. In many of these we find the shaft representing a knotted cane, or a spiny branch, with truncated shoots and leaf stalks. They may be cited as examples of the taste of the ancients, in adapting ornaments to things of common use, to augment their utility, and,

and, at the same time, preserve the type of the objects which give rise to any useful invention. The buds and shoots represented ornament the shafts of the candelabra, which would otherwise be too plain; they are convenient in affording a firm grasp to the hand, and at the same time they appear to give the history and agreeably recal the simple origin of these utensils. The same art which in stone and marble preserved the original forms of the wooden hut, has perpetuated in bronze the reed or staff, which supporting a tablet, formed the primitive candelabrum.

Among the considerable number of the candelabra in the museum of Portici there are many varieties. Their greatest height is five feet. The shaft of one of these is square, and on the upper part, immediately below the tablet upon which the lamp was placed, is represented a double head, one face of Mercury, and the other of Perseus. The greater number are in the form of a column placed upon a spreading base, composed of three paws, and above the shaft is placed a circular tablet, forming the lamp stand. The ornaments are various; in some the shaft is fluted longitudinally; in others, the flutings are formed spirally; and there is equal diversity in the capitals.

Candelabra of this kind are not employed by any modern European nation: the disuse of these elegant utensils is owing to the circumstance of candles having superseded lamps.

In Italy the practice of placing round the altar large chandeliers seemed to be an imitation of ancient customs in this respect; the size and the shape even of some of these chandeliers preserve a tolerably just idea of the ancient candelabra, but they differ essentially from these in the socket necessary to receive the candle, and support it in a straight and immoveable position, and still more in the choice of forms and taste of ornament. The finest, or, at least, the most rich and boasted modern works of this kind, are the chandeliers of St. Peter's, the design of which is attributed to Michael Angelo. Notwithstanding the name of this great artist, the richness of the material, and the beauty of the workmanship, it must be confessed that their form is too much divided, the ornaments are capricious, and their proportion very insufficient for the situation which they occupy.

CANDELARES, in *Botany*, the sixty-second order in Linnæus's fragments of a natural method published in the *Philosophia Botanica*. It consisted of *Rhizophora*, *Mimufops*, and *Nyssa*: but was afterwards abolished by him, and its three genera referred to the *Holeraceæ*.

CANDELARIA, in *Entomology*, a species of *FULGORA* peculiar to China, that possesses the power of emanating a clear and vivid light from the extremity of its snout in a similar manner to that emitted from the abdominal rings of our common glow-worm (*lampyris noctiluca*). It is specifically distinguished from the *Fulgora*, by having the snout ascending: wing-cases green with pale yellow spots; wings yellow, and black at the tip. Linn. Fabr. Donovan. Inf. China. See also article *FULGORA*.

CANDELARO, in *Geography*, a river of Naples, which runs into the sea, 3 miles S. of Manfredona.

CANDERN, a town of Germany, in the circle of Suabia, and margraviate of Baden-Durlach; 11 miles N.E. of Bâle, and 52 S. of Strasburgh.

CANDEROS, in the *Materia Medica*, a name of an East Indian gum not much known among us, though sometimes imported. It has much the appearance of common amber, only that it wants its yellow colour, being white and pellucid; we sometimes see it turned into toys of various kinds, which are very light, and of a good polish. Garcias and some other authors tell us, that Borneo, and some other places where camphor is produced, have the art of adulterat-

ing the crude camphor, which they send over to us, with large quantities of this gum.

CANDES, in *Geography*, a town of France, in the department of the Indre and Loire, and chief place of a canton in the district of Chinon, at the conflux of the Vienne and Loire; 2 leagues N.W. of Chinon.

CANDETTA, a small island in the Adriatic, near the coast of Greece. N. lat. 39°. E. long. 21°.

CANDIA, a large island in the Mediterranean, anciently called *Crete*, (which see), is about 60 leagues in length, and about 13 at its greatest breadth, and partly situated under the 35th degree of N. lat. and comprised between 23° 30' and 26° 30' E. long. For the early history of this island, see *CRETE*. Its first foreign masters were the Romans; who reduced it to the state of a Roman province in consequence of the conquest of Q. Cæcilius Metellus, hence surnamed "Creticus," or the Cretan, in the year 66 B. C. In this state of subjection to the Romans, under the emperors of the East, it continued till the Saracens, who had settled in Spain, induced by the fertility and pleasantness of this island, equipped a fleet for subduing it. Accordingly they landed in a convenient place, and for their security built and fortified a city, called "Chandax," or "Candax," signifying in their language "entrenchment," A. D. 812. From hence they made frequent excursions, and, in spite of the efforts of Michael II. surnamed Balbus, or the Stammerer, they soon after reduced the whole island, and called it "Chandax," which was afterwards changed into Candia. In 962, Nicephorus Phocas drove the Saracens from this island, and reunited it to the empire of the East, of which it formed a part till the capture of Constantinople by the crusaders in 1204. In recompence of the services which the Venetians had rendered to Baldwin in the siege of this city, Candia, together with some other islands in the Archipelago, was given to them. In 1207, this island was subdued by the Genoese; and in 1211, Boniface, marquis of Montferrat, sold it to the Venetians. In 1646, the Turks made a descent upon the island; and, having captured Canea, and prosecuting the siege of Candia, which was one of the most bloody and desperate that was ever recorded in history, they compelled the Venetians to surrender it, A. D. 1669; and the whole island, a few fortresses excepted, was ceded to the conquerors. In 1715, the Turks made themselves masters of the Venetian forts; and since this time the whole island has belonged to them.

Sonnini suggests that, as the island of Candia extends from east to west, whilst the other islands of the same sea lie, with respect to their length, in a north or south direction, somewhat inclining towards the east or west, it was detached from Africa by an inundation of the low lands which formerly united them: and this junction of Candia with the coast of Barbary acquires, he says, an additional degree of probability, when we direct our attention to the shallowness of the channel which separates them, whose bottom every where affords soundings. Candia resembles the other islands of this part of the Mediterranean, in having a chain of high mountains, called, from the snow that covers them in the winter, the "White Mountains," that traverses its whole length. The island is divided into three pachaliks, or governments, the chief places of which are Candia, Canea, and Retimo. In the first of these towns is a pacha with three tails, seraskier, or general in chief of all the forces of the island. In the other two is a pacha with two tails, independent of that of Candia, as to the administration of the police, but subject to him in every thing that concerns the military department. All three, in their turn, and in their respective provinces, superintend the collection of the impost,

and

and the safety of the places that are entrusted to them. They also cause justice to be done by the Cadis, and order their sentences to be executed. Each pachalik is divided into a certain number of districts, and each district comprises a certain number of villages, of which some belong to the imperial mosques, and others to the sultana-mother; and the greater number are granted for life to agas, or lords, in consideration of a sum of money paid into the imperial treasury, and an annual quit-rent, which is lodged in the coffers of the treasurer of Candia, for the maintenance of the fortresses and the pay of the troops of the country. All land owners pay to the aga, to the mosque, or to the sultan, a seventh of the produce of their lands; and they are obliged to carry their olives to the mills, which the agas alone have a right to cause to be constructed. Oil pays a seventh. The police of the village belongs to the aga, who appoints, for subordinate administration, a soubachi, or subaltern tyrant, more greedy and more untractable than his master. No Greek can marry without the permission of the aga, which is to be purchased by a present; and the aga sometimes appropriates the female who is proposed for marriage to himself; and when he wishes to part with her, he marries her to some Greek inhabitant of the village, who dares not refuse her. Married men are not allowed to quit the island, unless they are mariners, or merchants; but bachelors may go to work in the Morea, or elsewhere, upon paying a tax of 60 parats, or two piastres a head before their departure. If a murder happen in a village, or within its territory, and the delinquent be unknown, the aga must pay to the pacha a sum of money, which is levied on all the inhabitants, reserving a part for himself. Taxes are arbitrary, and in their amount depend on the population and circumstances of the inhabitants. For the death of a muselman, the fine is exorbitant, and is almost always attended by the death of several Greeks. The Turkish villages, as well as those of the Greeks, are subject to the police of the aga; but those which belong to mosques or to the sultana-mother, are less oppressed than the others. The Greeks can neither occupy employments proceeding from the government, nor can they be admitted into any corps of troops, unless they have embraced the religion of Mahomet. Thus the island, which long prospered under the laws of Minos, is now governed; and thus the inhabitants of a country where liberty in a manner took its birth, are bent under the yoke of the most ignominious slavery. Among the people, who at this day inhabit the island of Candia, we may reckon Abadiots, Mussulmen by religion, Arabs by origin, and some remains of the Saracens whose ancestors formerly occupied it. The Abadiots are swarthy, meagre, and of middling stature, and in their disposition mistrustful, malicious, and vindictive; they always go armed like the Turks, and kill each other on the smallest provocation. They occupy 20 little villages to the south of mount Ida, and form a population of about 4000 persons. They afford an asylum to the Turks and Greeks who have committed any crimes, whom they themselves kill if they become troublesome. When they have an opportunity, they rob the friars in the Greek monasteries that lie within the reach of their villages. The inhabitants of the high mountains to the south of Canea and Retimo are considered as the real descendants of the ancient Cretans, and are known by the name of "Sphachiots." They are distinguished from the other Greeks by their tall stature, handsome look, love of liberty, courage, skill, and above all, by the hatred which they have vowed against the usurpers of their island. These Sphachiots have found means to preserve their laws and their customs under the Romans, the Saracens, the Venetians, and the Turks. Obligated by the Turks to transport, in summer,

from the tops of their mountains, the ice necessary for the consumption of the inhabitants of Canea and Retimo, they paid no tax nor import; they had no agas; they never saw among them the agents of the Turkish government; and they formed a republic, in some measure independent, till, in 1769, the happiness which they enjoyed on their mountains was interrupted by the part they took with the Russians, and the Turks retaliated upon them their revolt by hostile measures that proceeded almost to their utter extermination. The amount of the population of this island consisting of Greeks and Turks is estimated by Olivier at 240,000.

The climate of Candia has from remote antiquity been deemed singularly healthful, which has been attributed to the abundance of its salutary plants. Hippocrates sent his patients thither to breathe the air charged with wholesome vapours. The Turks in the island of Candia, under the happy influence of its climate, have there acquired a taller stature, muscles more prominent and more strongly marked, broader chest and shoulders, all the proportions which constitute beauty and strength, together with an imposing step and carriage; although with all these advantages, the sternness of their countenance gives to their majestic exterior a formidable impression. The Greeks, on the other hand, are of a stature less tall, a corpulence less prominent, a step less solemn, a make less robust, but more graceful; and they seem to have degenerated under a climate which is natural to them, and in which they are abandoned to slavery, which alike degrades both the form of the body and that of the mind. The same disparity in the exterior attributes of the Turk and the Greek, is also observed among the women of the two nations. The Turkish women are there handfomer than in the other parts of the east; whereas the female Greeks have, generally speaking, fewer charms than they possess in several other countries. The dance of the Greeks of Candia is referred to a very remote antiquity. Homer (Il. l. xviii. sub fin. Pope's version.) has described it; and it is the image of the labyrinth of Crete, of which it imitates the windings and turnings. It is serious and grave, though not destitute of simplicity and nobleness. Their songs are slow and languid, and the habit which the Greeks have of singing through the nose renders their songs still more drawing and less sprightly.

With the exception of the leprosy brought to this island from Asia, there are no contagious nor prevailing disorders in Candia.

One of the best cultivated and most productive of the provinces of this island is *Kissamos*. To the south of this province is *Selino*, to the north of these two provinces is *Cidonia*, and to the south *Sphachia*. Three leagues from the town of Canea commences the province of *Apocorona*, which extends to the east as far as *Armiro*, and to the south as far as the mountains of *Sphachia*. This province is mountainous, and furnishes abundance of oil, but a small quantity of barley and wheat, and very little wine. It is more peopled by Greeks than by Turks. The province of *Retimo* is well cultivated and very productive. To the south of this are the two provinces of *Aion-Vassali* and *Amari*, furnishing wheat, barley, oil, and some fruits. The former, situate N.W. of the other, supplies also excellent cheese. In these provinces the Greeks are more numerous than the Turks. The first province that occurs in the north part of the island, after quitting the territory of Retimo, is called *Nilo-Potamo*. The province of *Candia* affords very little cotton, but abundance of wheat and barley, and a considerable quantity of raisins, which last are shipped for the supply of Syria and Egypt. In this territory there are scarcely any olive-trees. The Turks are here as numerous as the Greeks. To the south of Candia lies the province of *Messara*, which is reckoned

reckoned the granary of Crete; and to the east of Candia lies the province of *Mirabel*, to the south of which is the province of *Hiera Petra*, or *Gera-Petra*. The province of *Settia* occupies the whole eastern part of the island. For a more particular account of each of these provinces, see *Kissamos*, *Selino*, &c.

Notwithstanding the various alimentary productions furnished by this island, the Greeks live through the whole year on barley bread, salted olives, and wild plants. The more delicate articles of subsistence they sell in order to discharge the taxes, or to pay the too frequent extortions of their agas. Mutton and pork are every where excellent and cheap. Lambs and kids are likewise to be obtained in the three principal towns during several months of the year. The argali and wild goat are plentiful on the mountains. Beef is scarce, and the ox is little used but in rural labour. Poultry may be procured with ease, and at a cheap rate. Turkeys are sold at a very moderate price; and the island abounds with a great variety of birds fit for food, as the quail, turtle, ring-dove, lorio, roller, thrush, and fig-peckers. The woodcock passes the winter in this island, and the blackbird remains all the year. In spring and summer, larks, ortolans, and many small birds supply the place of birds of passage. The hare and partridge are very common. There are few countries in the Levant that afford a greater variety of useful and interesting vegetables than the island of Crete. Agriculture is subject to many discouragements and restraints in the island of Candia; and industry is checked by the oppression and rapine of the agas, pachas, and janizaries. Such is more especially the case in the villages and territories belonging to the Greeks. The Turks are less oppressed; and the Sphachiote, more sure of enjoying the fruits of his labour, exerts a greater degree of energy and activity. Public granaries are very common near the principal towns; they were probably constructed in the time of the Venetians, and they consist of large square pits in masonry, coated with a cement capable of securing from moisture the grain contained in them. The opening is narrow, and carefully closed. As the island does not grow a sufficient quantity of corn for the supply of its inhabitants, a large quantity is annually imported from Volo, Salonica, the Morea, Syria, and Egypt. Wine is made only in a few districts; in others, the inhabitants prefer carrying their grapes to the town, or drying them for trade. The mulberry tree vegetates very well in Candia, and silk-worms thrive wonderfully; and yet the silk used in their meanest manufacture is brought from Syria. Some cloths, in silk and cotton, and in silk and flax, are manufactured and consumed in the country. Flax, though tolerably plentiful, is not cultivated in sufficient quantity for the use of the inhabitants; a great deal is drawn from Egypt. Cotton is little cultivated; that which is consumed being brought from Smyrna and the environs of Ephesus. Sesamum is cultivated for the purpose of mixing its seed with bread, in order to give it flavour. One of the productions of Candia, which has preserved its ancient reputation, is wine, which, in some districts, is still delicious. It is well known, that Homer has praised the wine of Crete, and that Jupiter drank no other nectar during his stay in this island. The malmsey, which is made in the environs of mount Ida, is much esteemed; but all the Candian wines must be drunk with caution, as they are of a fiery quality, and apt to fly quickly to the head and to shake the nerves. In several places forests of pines, cedars, and firs cover the declivity of the mountains, and crown the summit of the hills; and afford, by their straight and tall stems, as well as by the resin which exudes from them, abundant resources for nautical purposes. On the mountains in the vicinity of Canea, and at the foot of

mount Ida, grows a species of rock-rose (*Cistus ladaniferus*, Linn.), which yields ladanum, or labdanum, serving for perfumes and the preparation of certain drugs. The horses of Candia, the race of which originally came from Barbary, have much degenerated in form and beauty. Nevertheless, none can be compared to them for strength and suppleness of limbs, and for being sure-footed. The dogs of the island were formerly reckoned, on account of their fleetness and agility, the best in Greece, next to those of Lacedæmonia. But, under the Turks, their race is degenerated. The dogs of Candia are a new species of large greyhounds, or coursing dogs, which, with a little attention, might be handsome animals; but in this land of tyranny and slavery these animals are neglected. It is said that in Candia no carnivorous and ferocious animal exists; and it is certain that if such quadrupeds once inhabited this island, their races have entirely disappeared. But the ancients have blended exaggeration with their accounts, when they assert that birds of prey would not subsist here. It was also asserted, without foundation, that the island of Candia was exempt from serpents, and other venomous animals. Pliny, however, has made an exception in favour of the phalangium, or tarantula. Belon has observed, that three species of serpents were known here; and Sonnini says, that there exists a species of spider as dangerous as the tarantula, which lives in subterraneous retreats, and is of the species of the mason, or mining spider, circumstantially described by Latreille in the "Mem. de la Société d'Hist. Nat." Whether the gecko (*lacerta gecko*, Linn.) be found on this island is not absolutely certain; but it is not improbable, as it is met with in other countries of the east, in the vicinity of the island of Candia, and particularly in Barbary and Egypt. The hydrophobia is said to have occasionally, though seldom, made its appearance in Candia; and Dapper mentions that this island has been frequently afflicted by mad dogs. The remedy purchased by the king of Prussia, and published in 1777, is known there. The insect that furnished this specific, which the Candians employed from time immemorial as a sovereign antidote to madness, is the *meloe*, or oil-beetle, (*Meloe proscarabæus*, Linn.) the larva of which bears the name of "May-worm." In Candia it is reduced to powder, which the patient swallows; and it is said to be of so active a nature, as to occasion convulsions, pains in the bowels, inflammations, agony, bleedings at the nose, bloody urine, and even death, when taken in too large a dose. Such dangerous means of cure have been wisely relinquished by modern practitioners. The multiplication of bees is a branch of rural industry, which is encouraged in this island. The ancients indeed feigned that Jupiter had been fed on the honey obtained from the bees of mount Ida.

The only articles of exportation from this island are, oil, soap, wax, honey, cheese, raisins, almonds, walnuts, chestnuts, St. John's bread, linseed, and liquorice-root. The imports supplied by the French consist of woollen cloths, laces, and stuffs of Lyons, imperial serges of Nismes, small shot, tin, iron, steel, coffee, sugar, nutmegs, cloves, indigo, cochineal, paper, and various articles of hard-ware. Venice and Trieste supply glass-ware, hard-ware, and, particularly, planks for making soap-cases; and Caramania, or Greece, furnishes almost all the wood necessary for the soap-houses. The islanders themselves carry on some trade: from Salonica they draw corn, cotton, tobacco, and iron; from Constantinople, Bursa stuffs, Angora châlits, shoes, handkerchiefs, and copper utensils. At Smyrna they take hides, Turkey leather or Morocco, cotton, quilted coverlids, English shaloons, and some French goods. At Gaza they take ashes for their soap-houses: at Aleppo, silk stuffs; and they purchase on the coast of Syria corn and silk. Egypt supplies them with corn and rice, flax,

linen cloths, and ashes. Derna and Bengazi, on the coast of Africa, send butter known under the name of Mantegue, which is a mixture of butter and mutton-suet, used by the orientals in their ragouts and pastry. Tunis and Tripoli exchange their caps and their corn for soap and sequins. The wool is coarse and short, and wholly consumed in the country. The hone is a well known article of commerce from Candia and Stancho.

The north coast of this island has the greatest number of harbours and roadsteads; in which are many excellent anchorages; but the south coast affords few places where a ship can rest in safety. The rivers of the island are principally torrents swelled in winter by the rains, and in spring by the melting of the snow; but they have a considerable number of springs, which the inhabitants use for the watering of their lands. During the three summer months, the excessive heat of the sun is constantly tempered every day, from eight or nine in the morning till the evening, by the rapid current of air which prevails from North to South on the northern coast of the island. This refreshing wind, called "embat," takes its course, and is modified through the Levant, according to the direction of the coasts and the extent of sea which lies before them. In the island of Candia winter is, properly speaking, no more than a rainy season, during which the sky is more charged with clouds, and the heat less powerful, but never such as to make it necessary to have recourse to artificial warmth. However, in this season the mountains are covered with snow, and in some places it remains till the month of June. Sonnini's Travels in Greece, p. 209, &c. Olivier's Travels in the Ottoman Empire, vol. ii. p. 180, &c.

CANDIA, the *Khandak* of the Arabs, derived from *chandax* or *candax*, is a maritime town of the island above described, and, though less populous and commercial than *Canea*, reckoned its capital. Some geographers have supposed that its scite is that of the ancient *Cytaum*; others suppose it to have been *Matium*, and others again refer it to *Heraclea*. Olivier places *Cytaum* 4 leagues to the west, and *Matium* 2 leagues to the east, and *Heraclea* 4 or 5 leagues to the east; and Candia he imagines to have been port *Panormus*, which lay, according to Ptolemy, between *Cytaum* and *Heraclea*. Candia is situated on a pleasant plain, intersected by beautiful hills, which share its fertility, and the ground on which it stands is supported towards the sea by a strong wall built on rocks, which affords an agreeable walk. The approaches of the place are defended by sea with several pieces of cannon, and it is guarded on the land side by walls of a solid construction, a good ditch, and some advanced works. The form of the town, consisting of straight streets and regular squares, and the substantial construction of the buildings, indicate that it is not the work of the Turks, but that it owes its existence to the Venetians: at the same time its present state announces the dreadful ravages of war, and the slower havock of want, so that the houses constructed by them have disappeared. Here are still to be seen ruins which are the remains of the memorable siege which it sustained for twenty-four years, from 1646 to 1670, against the Ottoman forces. The decline of its commerce has changed its flourishing state and considerably reduced the number of its inhabitants, many of whom are removed to *Canea*, together with the foreign merchants. Although it is still the seat of the general government of the island, its population is disproportioned to its extent. It now contains scarcely 10 or 12000 Turks, 2 or 3000 Greeks, and about 60 Jews. The Greeks, who inhabited it before it became subject to the Turks, followed the Venetians at the time of its capitulation, and made their escape into the country: nor have they returned to settle in

a town, where their existence is incessantly threatened by the Janizaries, and their fortune frequently invaded by the Pachas. The handsomest churches damaged by the above-mentioned siege have been repaired and converted into mosques; but the fortifications have been carefully preserved. To the south-west of Candia, the first chain of mount *Ida* rises in the form of a pyramid, and seems at a distance as a land-mark to navigators, who wish to anchor in the harbour of that town. The harbour is defended from the north wind by rocks, on which has been built a strong jetty parallel to the coast: it is very secure; and might contain from 30 to 40 merchant-vessels, if it were kept in proper order. But the Turks have suffered it to be choked up, so that there are no more than eight or nine feet of water in the inside of the harbour, and about 15 at its entrance. It affords accommodation only to a few small barks of the country; and merchant-vessels can only enter it in ballast, or with a fourth of their lading. To this and other circumstances it is owing that the trade of Candia is almost annihilated. Navigators who frequent the harbour of Candia have been furnished by a long series of observations with means of ascertaining the state of the atmosphere in the open sea, from the sole inspection of the chain of mountains which encircles the town to the south. When the clouds collect in heaps above the most prominent of these hills, which bears the name of "*Calepo*," the weather is bad in the offing, and the wind almost always to the northward; navigators then take care not to quit the harbour. If, on the contrary, the ridge of the mountain is clear and free from vapours, they are certain of finding, without, the wind moderate and favourable for sailing out of the gulf, and getting clear of the coast.

The environs of Candia present a few fertile plains that are cultivated, and some rising grounds susceptible of cultivation. At a little distance to the south is seen the insulated pyramidal mountain already mentioned, at the foot of which is a passage to the ruins of *Gortyna*, and its labyrinth: to the Europeans this mountain is known by the name of *Jupiter's mountain*. To the south-west, mount *Ida*, covered with snow almost all the year, throws out on one side some branches towards the town; and, on the other, runs to join the mountains of *Sphachia*, covered in like manner with snow during eight or nine months. In this town there are 25 soap-houses, which employ the greater part of the oils of the province, and of those situated in the east part of the island. Candia forms one of the three pachalicks of the island. See CANDIA. N. lat. 35° 10'. E. long. 25° 18'.

CANDIA, a town of Italy, in the Milanese; 12 miles W. of *Vercelli*.

CANDIA, a township of America in Rockingham county, New Hampshire, N. of *Chester*; about 36 miles W. of *Portsmouth*; incorporated in 1767, and containing 1040 inhabitants.

CANDIDA, in *Conchology*, a species of *ARCA*, the shell of which is pellucid, rhomboid, produced in front, truncated behind, and decussated with striæ; beaks remote; posterior margin gaping, the opening ovate and ciliated. *Chemnitz*, &c. A native of the American and African shores. This kind is white, somewhat granulated, and covered with a blackish subfuscous epidermis.

CANDIDA, in *Zoology*, a species of *ACTINIA*, described by *Müller* as a native of the northern seas of Europe. This is smooth, with a rugose aperture, the tentacula resembling bristles, and disposed at the margin.

CANDIDATE, a person who sets up for some post or place, either of honour or profit.

The word is formed of *candidus*, white; on account of a white shining garment, *toga candida*, in which those who aspired

aspired to preferments in ancient Rome were habited, at the time of their appearing for the same, especially at the public assemblies, in order to distinguish them from the crowd. The white gown worn by candidates was loose and ungirded, nor was there any close garment under it, which some interpret as done with design to avoid any suspicion people might have of bribery; though Plutarch rather thinks it done to gain the affections of the people, by going in such an humble garb; or else that such as had received wounds in the service of their country, might more easily exhibit those tokens of their courage and fidelity. The Roman candidates usually declared their pretensions a year before the time of election, which was spent in making interest and gaining friends. Various arts of popularity were practised for this purpose, and frequent circuits made round the city, and visits and compliments to all sorts of persons, the process of which formed what was called *AMBITUS*.

CANDIDATE of baptism, in the *Ancient Church*, was called *CATECHUMEN*.

CANDIDATES, in the *COLLEGE of Physicians*, London, is the order of members, out of whom the fellows are chosen.

The candidates must be natives of England, doctors of physic, admitted to the degrees in our own universities, and ought to have practised physic four years before they are admitted into the order. The number of candidates is never to exceed twelve. *SEC COLLEGE*.

CANDIDATE, in *Academical Orders or Degrees*, denotes a person to whom, after full examination, and the performance of inaugural exercises, licence is granted to take up the highest or doctoral dignity when he pleases. See *DEGREE*, *DOCTOR*, *LICENTIATE*, &c.

CANDIDATI principis, were those who were recommended to any offices by the emperors. The *candidatus principis* was also an office in the court of the emperor of Constantinople, answering to a secretary of state among us.

The *candidatus principis* was denominated *Quæstor principis*, or *Augusti*.

CANDIDATI milites. Among the Romans, these were soldiers distinguished by their figure, stature, and valour in combat. They were placed near the emperor, who was an eye-witness of their exploits. They served him as his bodyguards to protect and defend him. It is said that Gordian the younger first instituted them as well as the *PROTECTORES* and *SCHOLARES*; which articles see.

CANDIDUM, in *Conchology*, a species of *BUCCINUM*, described by Martini. This shell is oblong, turbinated, solid, smooth, and white. Country uncertain.

CANDIDUM, *promontorium*, in *Ancient Geography*, *Bas-el-Abeach*, a promontory of Africa, N. W. of that of Apollo; mentioned by Livy, Pliny, and Mela.

CANDIDUS, in *Entomology*, a species of *CERAMBYX*, (*Saperda*, Fabr.) Colour white; thorax and body fuscous, with two white stripes. Fabricius. The country of this insect is unknown.

CANDIL, in *Commerce*, an East Indian weight equal to 540 pounds avoirdupois.

CANDIPATNA, in *Ancient Geography*, a town of India, on this side of the Ganges, in the country of the Arvarians, according to Ptolemy.

CANDLE, a cotton or linen wick, loosely twisted, and covered with tallow, wax, or spermaceti, in a cylindrical figure; which, being lighted at the end, serves to illuminate a place in the absence of the sun.

The word *candle* comes from *candela*, and that from *candor*, of *candeo*, *I burn*; whence also the middle age Greek *κάνδηλα*.

A tallow candle, to be good, must be half sheep's and half

bullock's tallow; the fat of hogs makes them gutter, gives an ill smell, and a thick black smoke.

Tallow candles are of two kinds; the one dipped, the other moulded: the first, which are those in ordinary use, are of an old standing; the latter are said to be the invention of the sieur le Brez, at Paris. The manufacture of the two kinds is very different, excepting in what relates to melting of the tallow, and making the wick, which is the same in both.

CANDLES, method of making. The different kinds of tallow being weighed and mixed in their due proportion, are cut or hacked into pieces, to facilitate their melting, and thrown into a pot or boiler, having a cavity of some depth running round the top, to prevent its boiling over. Being thus perfectly melted and skimmed, a certain quantity of water is thrown in, proportioned to the quantity of tallow; this serves to precipitate the impurities of the tallow, which had escaped the skimmer, to the bottom of the vessel. The tallow, however, intended for the first three dips, must have no water; because, the dry wick imbibing the water readily, makes the candles spit and crackle in the burning. The melted tallow is now emptied through a sieve into a tub, having a tap for letting it out, as occasion requires. The tallow, thus prepared, may be used after having stood three hours; and will continue fit for use twenty-four hours in summer, and fifteen in winter. The wicks are made of spun cotton, which the chandlers buy in skeins; and they wind off three or four together, according to the intended thickness of the wick, into bottoms, or clues, from a certain number of which threads are drawn off, and then cut with an instrument contrived for that purpose, into pieces of the size and length of the candle required. The machine for cutting the cotton consists of a smooth board adapted to rest on the knees; (see *Plate, Candle-Making, fig. 1.*) on the upper surface of which are the blade of a razor, or a knife, A, and a pin or round piece of cane, B, placed at a certain distance from one another, according to the length of the cotton that is wanted: the cotton is then carried round the cane, B, and being brought to the razor, or knife, A, is instantly separated from the several bottoms or balls. The next operation is that of "pulling the cotton," which is that of laying smooth the threads, removing all knots, &c. and thus rendering it fit for use. It is then put on the sticks, or broaches, or else placed in the moulds, as the candles are intended to be either dipped or moulded. The broaches are rods about half an inch in diameter, and somewhat more than three feet long.

CANDLES, making of dipped. The liquid tallow is drawn off from the tub above mentioned, into a vessel called the mould, sink, or abyss, of an angular form, perfectly like a prism, except that it is not equilateral, the side on which it opens being only ten inches high; and the others, which make its depth, fifteen. On the angle, formed by the two great sides, it is supported by two feet, and is placed on a kind of bench, in form of a trough, to catch the droppings, as the candles are taken out at each dip. At a convenient distance from this is seated the workman, who takes three sticks, or broaches at a time, strung with the proper number of wicks, viz. sixteen, if the candles are to be of eight in the pound; twelve, if of six in the pound, &c. and holding them equidistant, by means of the second and third finger of each hand, which he puts between them, he immerses the wicks two or three times for their first lay, and, holding them some time over the opening of the vessel to let them drain, hangs them on a rack, or frame, where they continue to drain and grow hard. When cooled, they are dipped a

second time, then a third as before; only for the third lay they are immersed but twice, in all the rest thrice. The operation is repeated more or less times, according to the intended thickness of the candles. With the last dip they neck them; i. e. plunge them below that part of the wick where the other lays ended. Such as we have above described used to be the laborious method of making common candles; till within 15 or 20 years past, when an invention was introduced which served very much to diminish the labour and to facilitate the operation. This method of making dipped candles, as now practised by the manufacturers in London, is as follows: the wicks prepared as above are hung at equal distances upon the broaches; and when five of these are filled, they are put into holes in two pieces of wood, C, D, (*fig. 2.*); thus forming a frame full of wicks. The vessel, A, (*fig. 1.*) is then filled with melted tallow. This vessel is made of lead, and has a hole, B, under it for receiving a chaffing-dish to keep the tallow warm; on each side of the vessel are two leaves, C, D, for catching the droppings of the candles as they are dipped; over the vessel is suspended from the ceiling a framed lever, K, K, with two arched heads, L, L, at each end, in order to give a vertical motion to the scale, I, and frame, EFGH, the two cross pieces, E, F, of which are for the leaves, C, D, of *fig. 2.* to rest upon. The dipper then lays hold of the upper bar at G and H, and gently pushes down the wicks into the melted tallow, and keeps them down till he finds that, by the tallow adhering to them, they are heavier than the weight in the scale I, previously adjusted to the proper weight. The frame of candles is then removed and hung up to cool, which takes some days, according to the state of the weather. When they are quite stiff, they are dipped again with a heavier weight in the scale I, and this operation is continued, till they are of the proper size. The workman, by means of this simple contrivance, has only to guide the broaches and candles, and not to support the weight of them as in the old method.

It must be observed, that during the operation the tallow is stirred from time to time, and the stock supplied with fresh tallow. When the candles are finished, their peaked ends, or bottoms, are taken off; not with any cutting instrument, but by passing them over a kind of flat brazen plate, heated to a proper pitch by fire underneath, which melts down as much as is requisite.

CANDLES, method of making mould. These candles are made in moulds of different materials; that generally used is pewter. Each candle has its mould, consisting of three pieces, the neck, shaft, and foot: the shaft is a hollow pewter cylinder, B, (*fig. 6.*) having the end *a* somewhat smaller than the other, that the candle may slide out easily, of the diameter and length of the candle proposed; at the extremity of this is the neck, A, which is a little metallic cavity, in form of a dome, having a moulding withinside, and pierced in the middle with a hole big enough for the wick to pass through. At the other extremity is the foot, in form of a little tunnel, through which the liquid tallow runs into the mould. The neck is foldered to the shaft, but the foot is moveable, being applied when the wick is to be put in, and taken off again when the candle is cold. A little beneath the place where the foot is applied to the shaft, is a kind of string of metal, which serves to support that part of the mould, and to prevent the shaft from entering too deep in the table to be mentioned hereafter. Lastly, in the hook of the foot, is a leaf of the same metal, foldered within side, which, advancing into the centre, serves to keep up the wick; which is here hooked on, precisely in the middle of the mould. The wick is introduced into the shaft of the mould by a piece of wire, which being

thrust through the aperture of the hook, till it come out at the neck, the wick is tied to it; so that in drawing it back, the wick comes along with it, leaving only enough a-top for the neck; the other end is fastened to the hook, which thus keeps it perpendicular, E E (*fig. 5.*) Ten or fifteen of these moulds, in this condition, are fixed in a frame pierced full of holes, the diameter of each being about an inch, by a screw at the top of each mould, which attaches them to the upper board B of the frame. This board has three upright sides and one sloping, which forms a small cistern for the tallow. When every mould in the frame has been provided with a wick, two wires, *cc*, (*fig. 5.*) are passed through the two ends of the cistern at the top of the frame, and the loops of the several wicks. The ends of the wicks which hang out of the mould are pulled tight, their tops are put over the centers of the moulds, and the friction of the mould keeps them in this position. These moulds are filled with tallow out of a cistern, A (*fig. 4.*) the outside of which is wood, and lined with lead; within which is another cistern of lead for containing the melted tallow, prepared as above, with about two inches space between them all round to be filled with hot water for keeping the tallow warm. In the bottom of the vessel are three small shuttles, B, C, D, communicating with the inner vessel, and serving to fill the moulds, E E, before described. After the frame is filled and the tallow has acquired its due consistence, the two wires, *cc*, are withdrawn, and the loose tallow in the cistern at the top of the frame scraped out; they are set out in the open air to cool, and when thoroughly cold, the candles are pulled out of the mould by a bodkin put through the loops of the wicks where the wires, *cc*, passed before.

Those who aim at perfection in their work, bleach or whiten their candles, by fastening them on rods or broaches, and hanging them out to the dew, and earliest rays of the sun, for eight or ten days: care being taken to screen them in the day-time from the too intense heat of the sun, and in the night from rain, by waxed cloths. Tallow-chandlers make other candles, which are intended to burn during the night without the necessity of being snuffed. The wick of these has been usually made of split rushes; but of late, very small cotton wicks have been substituted for the rush; these are much more easily lighted, are less liable to go out, and, on account of the smallness of the cotton wick, they do not require the aid of snuffers. The price of candles used formerly to be regulated by the masters and wardens of the tallow chandlers' company, who were accustomed to meet at their hall every month for the purpose; but now the price of every article belonging to the trade is fixed at the weekly markets.

CANDLES, wax, are made of a cotton or flaxen wick, slightly twisted, and covered with white or yellow wax. Of these there are several kinds; some called tapers, used to illuminate churches, and in processions, funeral ceremonies, &c. and others used on ordinary occasions.

As to the first kind, their figure is conical, still diminishing from the bottom, which has a hole to receive the point in the candlestick, to the top, which ends in a point: the latter kind are cylindrical. The first are either made with a ladle, or with the hand.

CANDLES, wax, manner of making with the ladle. The wicks being twisted, and cut off at the proper length, a dozen of them are tied by the neck, at equal distances, round an iron circle, suspended directly over a large basin of copper tinned, and full of melted wax: a large ladle full of this wax is poured gently, by inclination, on the tops of the wicks, one after another; so that running down, the

whole

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whole wick is thus covered; the surplus returning into the basin, where it is kept warm by a pan of coals underneath it. They thus continue to pour on the wax, till the candle arrive at its destined size: still observing, that the three first ladles be poured on at the top of the wick, the fourth at the height of $\frac{3}{4}$, the fifth at $\frac{1}{2}$, and the sixth at $\frac{1}{4}$; by which means the candle arrives at its pyramidal form. The candles are then taken down hot, and laid aside of each other, in a feather-bed folded in two, to preserve their warmth, and keep the wax soft: they are then taken and rolled, one by one, on an even table, usually of walnut-tree, with a long square instrument of box, smooth at the bottom. The candle being thus rolled and smoothed, its big end is cut off, and a conical hole is made in it.

CANDLES, wax, manner of making by the hand. The wick being disposed, as in the former, they begin to soften the wax, by working it several times in hot water, contained in a brass caldron, tinned, very narrow and deep. A piece of the wax is then taken out, and disposed, by little and little, around the wick, which is hung on a hook in the wall, by the extremity opposite to the neck; so that they begin with the big end, diminishing still, as they descend towards the neck. In other respects, the method is the same here as in the former case; only that they are not laid in the bed, but are rolled on the table, just as they are formed. It must be observed, however, that in the former case, water is always used to moisten the several instruments, to prevent the wax from sticking; and in the latter, lard, or oil of olives, for the hands, table, &c.

CANDLES, wax cylindrical, are made either with the ladle, or drawn. The first kind are made of several threads of cotton, loosely spun, and twisted together, covered with the ladle, and rolled, as the conical ones, but not pierced.

CANDLES, wax, drawn, are so called, because actually drawn, in the manner of wire, by means of two large rollers, or cylinders of wood, turned by a handle, which turning backwards and forwards several times, pass the wick through melted wax, contained in a brass basin; and at the same time through the holes of an instrument, like that used for drawing wire, fastened at one side of the basin: so that, by little and little, the candle acquires any bulk, at pleasure, according to the different holes of the instrument through which it passes: by this method, may four or five hundred ells at length be drawn, running. The invention of this was brought from Venice by Pierre Blesimare of Paris, about the middle of the 17th century.

The ascent of the tallow up the wick in a burning candle, may be resolved into the same principle of filtration, or attraction, as that of water up a heap of ashes, or even up a capillary tube. The wick of a candle is but slightly twisted, that all its hairs may be easily come at; which being very small, soon take the flame: and the flame by its heat rarefying the air, and dissolving the tallow underneath, makes the globules thereof ascend into the rarefied spaces of the wick, and these, with the air about it, prove food for the flame.

A patent was granted in 1799, to Mr. William Bolts of London, for new modes of improving the form, quality, and use of candles. The most material alteration in Mr. Bolts's invention from the common method of making candles, consists in saving the greater part of the wick by rendering it moveable; and for this purpose it is kept constantly soaking in the tallow as it melts, so that the cotton is consumed very slowly as in lamps fed with oil. The patentee employs two methods for accomplishing this object; one is that of making candles entirely solid, without any wick passing through them; and applying the wick, which is very

short, upon the top of the solid candle, where it burns like that of a lamp; the heat which it affords when first lighted being sufficient to furnish the first supply of melted tallow, and to continue it as long as any part of the candle remains unconsumed. In order to keep the wick constantly applied, it is fastened to a small projecting spring, into which it is firmly fixed; and the surface of the candle is always kept in contact with the wick, either by causing the wick stand to pass round the candle like a collar, which moving freely on the candle, will sink in proportion as this is consumed, or by making the wick stand immovable, and putting a spiral spring at the bottom of the candlestick, which constantly protrudes the candle upwards against the wick in proportion as the tallow is consumed. His second method of constructing the candles is that of forming them in the usual shape, but with a perforation through their whole length; and the wick in this case is a small tuft of cotton, which is put into the opening at the top of the hollow candle, and to its lower part is attached a thread which passes down through the perforation to the bottom of the candle, where it penetrates the candlestick, and is wound round a key or pivot, and by turning this pivot, the wick that is attached to the upper part of the thread will be pulled down in proportion as the candle consumes. This method prevents the guttering of candles, as all the tallow that is melted is readily absorbed by the wick. By a small variation in the form of the candle, it may be made to serve the purpose of an Argand's lamp; for which end it is composed of a hollow cylinder of tallow, including another cylinder also perforated; and the wick, which is of a circular form, is here placed between the inner and outer cylinders. In all these cases, the wick is composed of thread, placed longitudinally, and not twisted, as is the case with the common wicks, which undoubtedly assists the capillary attraction of the melted tallow. These wicks have also the advantage of not requiring to be snuffed, for removing the carbonaceous matter which escapes unconsumed from the tallow. Another advantage attending these detached wicks, is the ease with which their bulk may be proportioned to that of the candle, and to the fusibility of the material of which it is composed. The patentee also proposes another improvement, which is that of subjecting the melted tallow or other material to a considerable pressure, during the act of cooling; which is done by means of a condensing machine, pressing the surface of the liquid substance, and then giving it a greater degree of firmness and solidity when cold. The patentee has likewise described, and illustrated by a drawing, the contrivance which he has adopted for casting the hollow cylindrical candles. For a detail of other circumstances that occur in his patent, we refer to his specification in the Repertory, vol. xii. p. 368.

CANDLES, laws relating to. Every maker of candles for sale, other than wax candles, shall take out an annual licence at 1l. 24 Geo. III. c. 41. 43 Geo. III. c. 69. And every person making wax or spermaceti candles shall take out a licence at 6l., and for dealing in, or selling such candles shall pay 10s. 6d., and renew the same annually, under a penalty of 20l. 24 Geo. III. c. 36. 43 Geo. III. c. 69. But no person who hath paid such licence duty for making, shall be obliged to take out a licence for selling also, during the same year. 24 Geo. III. c. 41. By 24 Geo. III. c. 74., no person, residing within the limits of the head-office, shall be permitted to make candles, unless he occupy a tenement of 10l. a year, assessed in his own name, and for which he pays the parish rates; and elsewhere, unless he be assessed and pay to church and poor. By 43 Geo. III. c. 69., in lieu of any subsisting duties of excise, the following duties are imposed; viz. for every pound avoirdupois of candles, except those of
wax

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wax and spermaceti, made in Great Britain, 1d.; and for every pound of wax or spermaceti candles so made, 3½d. All places for making or keeping of candles, and of materials for the same, and furnaces, moulds, &c. for melting such materials, are forbidden to be used without notice previously given in writing at the next office of excise, under a penalty of 50l., and forfeiture of all candles and materials, furnaces, &c. which have not been entered. 8 Ann. c. 7. And by 11 Geo. c. 30., makers of candles who make use of such places or utensils without entry incur a forfeiture of 100l. Officers shall be permitted, at all times by day, and also in the night with a constable, to enter the house, melting-house, &c. of a maker of candles, and to take an account of the quantity, when all chests, &c. shall be opened; and the penalty of obstructing or molesting such officer is 100l.; or if candles, &c. be found in unentered places, the offender shall be convicted in the penalty of 100l. 11 Geo. c. 30.; see also 24 Geo. III. c. 11. and 27 Geo. III. c. 31. Any maker of candles shall give notice in writing to the proper officer of his intention to begin a course of dipping and preparing for the same, with a declaration of the time when he intends to commence his operation, and a specification of the number of sticks, moulds, &c. which he proposes to use, under a penalty of 50l. 10 Ann. c. 26. 11 Geo. c. 30. 24 Geo. III. c. 11. Such notice shall be given, within the limits of the head-office, 6 hours, within any city or market town, 12 hours, and elsewhere 24 hours, before he shall begin, on pain of forfeiting 50l. 25 Geo. III. c. 74. If he does not begin and proceed at the time mentioned, or within 3 hours next after, such notice shall be void. Having begun, he shall continue working without interruption, till the whole course is finished, on pain of forfeiting 50l. 26 Geo. III. c. 77. Every candle-maker shall provide sufficient locks and fastenings to every furnace, copper, mould, &c. to be secured by the officer, when they are not used; and he shall give notice in writing to the said officer, 6 hours before the time when he wishes to use them, within the limits of the chief office, 12 hours in any market town, and 24 hours elsewhere; any offence against the provisions of this act incurs a penalty of 100l. 27 Geo. III. c. 31. The officer shall charge for materials that are missing, after he has taken account of the same; and obstruction incurs a forfeiture of 20l. Candles that are spoiled in making shall be defaced by the officer, and he shall make allowance for the duty. No maker of candles shall, on pain of 20l., remove candles before they are surveyed; and those that have not been surveyed are to be kept separate from the others, on pain of 5l. 8 Ann. c. 9. On suspicion, that candles are privately made, or concealed to evade the duty, the ground of which has been stated on oath before two commissioners or one justice residing near the place, the officer may be empowered by special warrant, granted by such justices or commissioners, to enter the place suspected, and to seize as forfeited all candles that are found, and all materials for making them; and the person so offending, or obstructing the officer, shall forfeit 100l. 5 Geo. III. c. 43. 23 Geo. II. c. 24. If any chandler shall mingle candles not weighed by the officer with those that have been weighed, or remove any before weighing, or conceal any candles or materials, he shall forfeit 100l. 11 Geo. c. 30. Any person who is found assisting in privately making candles shall forfeit 20l.; and every person making candles shall once in every week enter the same in writing at the next excise-office, with their weight, number, size, and quantity; on pain for every neglect of entry to forfeit 20l.; and in one week, after such entry, he shall clear off the duties, on pain of double duty, nor shall he carry out candles till the duty hath been paid, on pain of double value.

25 Geo. III. c. 74. Persons buying, receiving, or having in their possession candles, not charged with the duty, shall forfeit the same, and treble value. 26 Geo. III. c. 77. Nor shall any person expose to sale any candles, unless in his public shop or warehouse, public fair or market, on pain of 5l. 8 Ann. c. 9. No candles shall be imported, otherwise than in some package containing at least 224lb. of neat candles, on pain of being seized and forfeited, and the master of the vessel shall forfeit 50l. 23 Geo. II. c. 21. 42 Geo. III. c. 93. And no candles imported otherwise than according to 23 Geo. II. c. 21., shall be entered for exportation. 42 Geo. III. c. 93. All wax candles seized on importation or otherwise, and condemned for non-payment of the duties, shall be rendered unfit for use. 24 Geo. III. c. 36. Candles for which the duty hath been paid may be exported, with a draw-back of the duty. 8 Ann. c. 9. 43 Geo. III. c. 69. If any maker of candles shall obstruct any officer in the execution of the powers given him by any act for securing the duties on candles, he shall for every such offence forfeit 100l. 24 Geo. III. c. 11. Every maker shall keep just scales and weights, and permit and assist the officer in the use of them, on pain of 10l. 8 Ann. c. 9.; and if he use scales and weights that are insufficient, he shall forfeit 100l. 10 Geo. III. c. 44.; and by 28 Geo. III. c. 37., the same shall be forfeited, and may be seized by any officer of excise. Obstruction of the officer in weighing or the hindrance of his taking a just account of stock, subjects to a forfeiture of 100l. 26 Geo. III. c. 77.

CANDLES, Observations on the manufacture, comparative value, and use of different. The Roman candles were at first little strings dipped in pitch, or surrounded with wax; though afterwards they made them of the papyrus, covered likewise with wax; and sometimes also of rushes, by stripping off the outer rind, and only retaining the pith. For religious offices, wax candles were used; for vulgar uses, those of tallow. Serv. ad. Æn. l. i. v. 731. Plin. Nat. Hist. l. xvii. c. 37. Lord Bacon proposes candles of divers compositions and ingredients, and also of different sorts of wicks; with experiments on the degrees of duration, and light of each. Good housewives are said to bury their candles in flour, or bran, which, it is said, increases their durability, almost one half. Some speak of perpetual candles made of Salamander wood. Bac. Nat. Hist. Cent. 4. c. 369. and Cent. 8. c. 744.

The two substances most commonly used in the manufacture of candles are wax and tallow. Wax owes its whiteness, and the greater consistency it acquires, to an absorption of the vital part of the atmosphere; and in this circumstance it seems principally to differ from tallow, or concrete oil. But as wax is already combined with a portion of vital air or oxygene, it does not burn with so luminous a flame as tallow or oil. But it possesses a very great advantage in the fabrication of candles, arising from its freezing point being placed at a considerably higher temperature than that of the other substance. Tallow melts at the 92d. degree of Fahrenheit's thermometer; spermaceti at the 133d degree; and bleached wax at 155°. Hence it will not be difficult to explain the chief advantage of wax candles compared with those of tallow. Oils, it should be considered, do not take fire, unless they be previously volatilized by heat: and this is effected by means of the wick of a candle, or lamp. The oil rises between the fibres of the wick by the capillary attraction. Heat, being applied to the extremity of the wick, volatilizes and sets fire to a portion of the oil. While this is dissipated by combustion, another portion passes along the fibres, or supplies its place by becoming heated and burned likewise. In this way a constant combustion is maintained. A candle, however,

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ever, differs from a lamp in one very essential circumstance; viz. that the oil, or tallow, is liquefied only as it comes to be in the vicinity of the conflagration; and this fluid is retained in the hollow of the part, which is still concrete, and forms a kind of cup. The wick, therefore, should not, on this account, be too thin; because if this were the case, it would not carry off the fluid as fast as it becomes fused; and the consequence would be, that it would run down the sides of the candle: and as this inconvenience arises from the fusibility of the oil, it is plain that a more fusible candle will require a larger wick; or that the wick of a wax candle may be made thinner than that of one of tallow. The flame of a tallow candle will of course be yellow, smoky, and obscure, except for a short time after snuffing. When a candle with a thick wick is first lighted, and the wick snuffed short, the flame is perfect and luminous, unless its diameter be very great; in which last case, there is an opaque part in the middle, where the combustion is impeded for want of air. As the wick becomes longer, the interval between its upper extremity, and the apex of the flame is diminished; and consequently the oil, which issues from that extremity, having a less space of ignition to pass through, is less completely burned, and passes off partly in smoke. This evil increases, until at length the upper extremity of the wick projects beyond the flame and forms a support for an accumulation of soot which is afforded by the imperfect combustion, and which retains its figure, until, by the descent of the flame, the external air can have access to the upper extremity. But in this case, the requisite combustion which might snuff it, is not effected; for the portion of oil emitted by the long wick is not only too large to be perfectly burned, but also carries off much of the heat of the flame, while it assumes the elastic state. By this diminished combustion, and increased efflux of half-decomposed oil, a portion of coal or soot is deposited on the upper part of the wick, which gradually accumulates, and at length assumes the appearance of a fungus. The candle does not then give more than one-tenth of the light which the due combustion of its materials would produce; and, on this account, tallow candles require continual snuffing. But if we direct our attention to a wax candle, we find that as its wick lengthens, the light indeed becomes less. The wick, however, being thin and flexible, does not long occupy its place in the centre of the flame; neither does it, even in that situation, enlarge the diameter of the flame, so as to prevent the access of air to its internal part. When its length is too great for the vertical position, it bends on one side; and its extremity, coming in contact with air, is burned to ashes; excepting such a portion as is defended by the continual afflux of melted wax, which is volatilized, and completely burned, by the surrounding flame. Hence it appears, that the difficult fusibility of wax renders it practicable to burn a large quantity of fluid by means of a small wick; and that this small wick, by turning on one side in consequence of its flexibility, performs the operation of snuffing upon itself, in a much more accurate manner than it can ever be performed mechanically. From the above statement it appears, that the important object to society of rendering tallow candles equal to those of wax, does not at all depend on the combustibility of the respective materials, but upon a mechanical advantage in the cup, which is afforded by the inferior degree of fusibility in the wax: and that, in order to obtain this valuable object, one of the following effects must be produced: either the tallow must be burned in a lamp, to avoid the gradual progression of the flame along the wick; or some means must be devised to enable the candle to snuff itself, as the wax-candle does; or the tallow itself must be rendered less fusible by some chemical process. With a

view to the first of these objects, a cylindrical piece of tallow was inserted into a metallic tube, the upper aperture of which was partly closed by a ring, and the central part occupied by a metallic piece nearly resembling that part of the common lamp which carries the wick. This piece was provided with a short wick. The cylinder of tallow was supported beneath in such a manner that the metallic tube and other part of this lamp were left to rest with their whole weight upon the tallow at the ring or contraction of the upper aperture. In this situation the lamp was lighted, and it burned for a considerable time with a bright clear flame, more uniformly intense than that of a candle, and superior to the ordinary flame of a lamp in its colour and the perfect absence of smell. After some minutes it began to decay, and soon afterwards went out. Upon examination it was found, that the metallic piece which covered the wick had fused a sufficient quantity of tallow for the supply during the combustion; that part of this tallow had flowed beneath the ring, and to other remote parts of the apparatus, beyond the influence of the flame; in consequence of which, the tube and the cylinder of tallow were fastened together, and the expected progression of supply prevented. In every lamp for burning consistent oils, it seems probable, says Mr. Nicholson (*ubi infra*;) that the materials ought to be so disposed as to descend to the flame upon the principle of the fountain reservoir. Although this construction failed, a contrivance of a similar nature would be of very great public utility. With regard to the second object above specified, Mr. Nicholson is led by various considerations to imagine, that the spontaneous snuffing of candles made of tallow or other fusible materials, will scarcely be effected but by the discovery of some material for the wick, which shall be voluminous enough to absorb the tallow, and at the same time sufficiently flexible to bend on one side. The most promising speculation respecting this most useful article, seems to regard the cup which contains the melted tallow. This is apt to break down by fusion, and thus to suffer its fluid contents to escape. The Chinese have a kind of candle about half an inch in diameter, which, in the harbour of Canton, is called a "lobchock." The wick is of cotton, wrapped round a small stick or match of the bamboo cane. The body of the candle is white tallow; but the external part to the thickness of about one thirtieth of an inch consists of a waxy matter coloured red; this covering gives a considerable degree of solidity to the candle and prevents its guttering, because it is less fusible than the tallow itself. The stick in the middle might probably be of advantage in throwing up a less quantity of oil into the flame than would have been conveyed by a wick of cotton sufficiently stout to have occupied its place unsupported in the axis of the candle. Mr. Nicholson says that he formerly made a candle in imitation of the "lobchock." For this purpose he adapted the wick in the usual pewter mould; he then poured in wax, which was immediately afterwards poured out; the film of wax, adhering to the inner surface of the mould, soon became cool; and the candle was completed by filling the mould with tallow. When it was drawn out, it was found to be cracked longitudinally on its surface, which he attributed to the contraction of the wax, by cooling, being greater than that of the tallow: or it might have been owing to the too sudden cooling of the wax before the tallow was poured in. The experiment was not repeated. After all, the most decisive remedy for the imperfection of this cheapest, and in other respects best material for candles, would undoubtedly be a diminution of its fusibility: with this view Mr. Nicholson made some experiments. The object is, in a commercial view, entitled to assiduous and extensive investigation. Chemists in general, suppose the hardness or less fusibility of wax to arise from oxygen

oxygen; and to this object attention should be directed in the inquiry. Nicholson's First Principles of Chemistry, p. 517. Nicholson's Journal, Vol. I. p. 70.

The Chinese obtain from the tallow tree (*Croton sebiferum*, Linn.) a kind of vegetable fat, with which they make a considerable proportion of their candles; which are firmer than those of tallow, and free from all offensive odour; but they are not equal to those of wax, or spermaceti. Cheap candles are also made of tallow, and even of grease of too little consistence to be used, without the contrivance of being coated with the firmer substance of the tallow tree or of wax. The surface of these candles is sometimes painted red. Their wicks are made of different materials. For their lamps, they use the amianthus, which burns without being consumable in fire, or the artemisia, and carduus marianus, with which tinder is also made; but for candles, they use a light inflammable wood, in the lower extremity of which is pierced a small tube to receive an iron pin, which is fixed on the flat top of the candlestick, and thus supports the candle, without the necessity of a socket. The candle-makers at Munich have for several years past prepared tallow candles with wooden wicks, which afford about the same quantity of light as a wax candle, burn also with great steadiness and uniformity, and never crack or run. These wicks are formed of very thin slips of wood, bound round to a considerable thickness with very fine unspun cotton, but such that the size of the wick does not much exceed that of the wick of a common candle. The candle-makers either purchase or prepare for themselves these slips of wood, which are somewhat square and not completely rounded, and are made of pine, willow, and other kinds of wood, but most commonly of fir. Some take shoots of the pine-tree a year old, or common fir twigs of the same age, scrape off the bark, and reduce them to the size of a small straw; they then rub over these rods with wax or tallow, till they are covered with a thin coating of either of these substances; after which they roll them on a smooth table in a very fine carded cotton, drawn out to about the length of the rod or candle-mould. After this preparation the wick will have acquired the size of the barrel of a small quill; and the more accurately the size of the wick is adapted to that of the candle-mould, so much the clearer and longer will the candle burn. These wicks are then placed very exactly in the middle of the mould, and retained in that position; and good fresh tallow, previously melted with a little water, is then poured round them; but old and rancid tallow will not run if the wicks be properly made. These candles not only burn longer than the common ones, but they do not flare, and they are less prejudicial to the eyes of those who are accustomed to read or write at night. They must be snuffed with a pair of sharp scissars, and in doing this care must be taken not to damage, or break the wick.

It has been suggested by Dr. Franklin, that the flame of two candles joined gives a much stronger light than both of them separate. Probably the union of the two flames produces a greater degree of heat, by which the vapour is attenuated, and the particles of which light consists more copiously emitted. Priestley's Hist. of Vision, &c. p. 807. For a comparison of the light of a candle with that of a lamp, see LAMP. For the method of estimating the intensity of candle-light, &c. see LIGHT and PHOTOMETER.

Dr. Ingenhousz has described in the Philosophical Transactions (vol. 68.) a method of lighting a candle by a small electrical spark. For this purpose he uses a small phial, having 8 or 10 inches of metallic coating, or even less, charged with electricity; and the operation may be performed at any time of the night by a person, who has an electrical machine in his room. "When I have occasion

to light a candle," says he, "I charge a small coated phial, whose knob is bent outwards, so as to hang a little over the body of the phial; then I wrap some loose cotton over the extremity of a long brass pin or a wire, so as to stick moderately fast to its substance. I next roll this extremity of the pin wrapped up with cotton in some fine powder of resin, which I always keep in readiness upon the table for this purpose, either in a wide-mouthed phial or in a loose paper; this being done, I apply the extremity of the pin or wire to the external coating of the charged phial, and bring as quickly as possible the other extremity wrapped round with cotton to the knob; the powder of resin takes fire and communicates its flame to the cotton, and both together burn long enough to light a candle. As I do not want more than half a minute to light my candle in this way, I find it a readier method than kindling it by a flint and steel, or calling a servant. I have found, that powder of white or yellow resin lights easier than that of brown. The "farina lycopodii" may be used for the same purpose; but it is not so good as the powder of resin, because it does not take fire quite so readily, requiring a stronger spark not to miss; besides, it is soon burnt away. By dipping the cotton in oil of turpentine, the same effect may be as readily obtained, if you take a jar somewhat greater in size. This oil will inflame so much the readier if you strew a few fine particles of brass upon it. The pin dust is the best for this purpose; but as this oil is scattered about by the explosion, and when kindled fills the room with much more smoke than the powder of resin, I prefer the last."

For the method of lighting candles by phosphoric tapers or matches, see PHOSPHORUS.

CANDLE, a term sometimes used in *Medicine and Surgery*. Thus, medicinal candles, *candela fumales*, are compositions of odoriferous, aromatic, and inflammable matters, as benzoin, storax, olibanum, turpentine, and the like, mixed up with a third or more of the charcoal of willow or lime-tree, reduced to a proper consistence with mucilage of tragacanth, and formed into masses in shape of candles. The effluvia and odours of these candles, when burnt, are supposed to be salutary to the breast, &c. For candles in surgery; see BOUGIE.

CANDLE, *corpse*, *canwyll corph*, in Welsh, a name given to a light or flame, resembling that of a candle, which, according to an opinion very commonly received in the diocese of St. David's in South Wales, proceeds from the house, and even sometimes from the bed, where a sick person lies a short time before his death, and pursues its way to the church where the corpse is to be interred, precisely in the same track which the corpse is afterwards to follow.

CANDLE, *sale* or *auction* by *inch* of. See INCH of Candle. There is also a kind of excommunication by inch of candle; wherein the time a lighted candle continues burning is allowed the sinner to come to repentance; but after which he remains excommunicated to all intents and purposes.

CANDLE-berry tree, in *Botany*, see MYRICA *Cerifera*. For the wax of this tree, see WAX.

CANDLE bombs denote small glass bubbles, with a neck of slender bore about an inch long, through which a small quantity of water is introduced, and the orifice is then closed up. When this stalk is applied to the wick of a burning candle, the flame soon rarefies the water into steam, the elasticity of which breaks the glass with a loud explosion.

CANDLE, *philosophical*, or *candle of the chemists*, as it is sometimes called, consists of a bladder having its orifice furnished with a tube of metal some inches in length, and capable of being adapted to the neck of a bottle, containing a composition formed in the proportion of 3 ounces of oil or spirit of vitriol, and 12 ounces of common water, to which,

when

when heated, is added an ounce or two of filings of iron. When the vapour or elastic air produced by the solution is discharged, apply the neck of the bottle to the orifice of the bladder, from which the air has been previously expelled by pressure, and it will be filled with the elastic fluid produced by the dissolution of the iron. When it is full, withdraw it, and apply to the orifice the flame of a torch, which will set fire to the vapour and cause it to burn slowly; and if the bladder be compressed, it will yield a fine flaming stream of a yellowish green colour.

CANDLES, *rush*, are made of the pith of a sort of rushes, peeled or stripped of the skin, except on one side, and dipped in melted grease. These are used among the poor in some parts of Great Britain.

CANDLE-wood, slips of pine about the thickness of the finger used in New England, and other colonies, to burn instead of candles, giving a very good light.

The French inhabitants of the island of Tortuga use slips of yellow santal wood for the same purpose, and under the same denomination of *bois de chandelle*, which yields a clear flame, though of a green colour. The nations of Otaheite use, as a substitute for candles, the kernels of an oily nut annexed, one above another, to a skewer that passes through them; the nuts answer the purpose of tallow, and the skewer that of a wick.

CANDLEMAS, a feast of the church, held on the 2d of February, in memory of the Purification of the Blessed Virgin.

It takes its name either from the number of lighted candles used by the Romish church, in the processions of this day; or because, before mass, the church consecrated candles for the whole year. This ceremony was prohibited in England, by an order of the council in 1548.

Candlemas is also called, in ancient writers, *Hypapante*; and among the moderns, the *Purification*.

Some will have this feast to have been instituted by pope Gelasius, in lieu of the heathen luperalia; and that procession was thereon made with lighted candles round the fields and grounds, by way of exorcism. Hence Bede says, "It is happy for the church to have changed the lustrations of the heathens, held in the month of February, around the fields, for the processions with hallowed candles, in remembrance of that divine light wherewith Christ illuminated the world, whence he was styled by Simeon, a *light to lighten the Gentiles*." Others ascribe the origin of candlemas to pope Vigilius, in the year 536, and suppose it instituted for the feast of Proserpine, held with burning tapers by the heathens in the beginning of February.

In Scotland, candlemas is one of the four terms of the year. See **TERM**.

In England, this is no day in court, for the judges do not sit; and it is the grand day in that term of all the inns of court, in which the judges anciently observed many ceremonies, and the societies seemed to vie with each other in sumptuous entertainments, accompanied with music and all kinds of diversions.

CANDLEMAS Isles, in *Geography*, two islands in the South Pacific Ocean, discovered by captain Cook in 1775. S. lat. 57° 10'. W. long. 27° 13'.

CANDLEMAS Shoals lie about 2° of latitude due N. of Port Prastin (which see), and were discovered, named, and passed by Mendana, in 1569.

CANDLESTICK, a household utensil, contrived to hold one or more lighted candles. Larger and more stately candlesticks, contrived for holding a great number of candles, are called *branches*, and *girandoles*; and when made of glass, *lustres*.

In the year 1800, Mr. Raybould, of London, obtained a

patent for candlesticks on a new principle, which will admit and firmly hold candles of various sizes. The candlestick of his invention is a hollow pillar of metal as usual; the candle is fixed into a socket composed of a broad circular ring, formed of two half cylinders cut down perpendicularly, and fixed in the same stand, so as to form a complete cylinder when joined together. Their approach to each other is regulated by a screw, so that they may be pressed upon a candle of any size, and will hold it firmly. The candle slides up and down the candlestick by means of a small knob which is fixed to the socket containing the candle, and projects on the outside through a longitudinal slit in the candlestick from the top to the bottom. The candle socket is kept up to any height by a spring which projects from its lower part, and presses on the outside of the hollow pillar, which forms the stem of the candlestick. *Fig. 7, Plate of Candle-making*, represents one of Mr. Echardt's patent candlesticks; it is calculated to set the candle at any height as it is consumed: to accomplish this the upper part A slides into that of B, and the part B slides up and down in that of C. In order that these slides may keep in the place they are set, the rim D, *fig. 7*, unscrews, and is represented separately in *fig. 8*. To the bottom of the rim is folded a copper cylinder, which goes within side of the tube c; in three or four places on this cylinder an oblong piece of the metal F is cut out, except at the upper end; it is then bent inwards, to give it a sufficient spring against the sliders A, B, to steady it: this contrivance is the same as is used in sliding telescope tubes. *Figs. 9, 10, 11, and 12*, represent different contrivances for making the nozzle of the candlestick fit different sized candles; in *fig. 9*, the two leaves A, B, which compose the nozzle, are so fixed to the part c, as to have a tendency to spring from each other; but they can be brought together to fit the candle, by sliding the ring D upwards. In *fig. 10*, the two pieces of iron plate A, B, are inclosed in a common vessel, and are riveted to it at c; they may be closed by the screw D, and their own elasticity opens them when the screw is slackened. In *fig. 11*, the size of the nozzle A is diminished by three segments of a circle *ab*, and another not seen, which, when the rim B, on the outside, is turned one way, they move into, and diminish the size of the nozzle A; but when it is turned the other, they draw back flush with the inside of the tube A. This is effected by the mechanism, represented in *fig. 12*, where *a, b, c*, are the segments moving on centres; on the inside of the rim B, C, are three knobs *b, b, b*, which, when they are moved round one way, press on the projections *a, b, c*, on the long end of the segments, and move them into the cavity A; but when turned the other, they press the knobs on the short end of the segments, and draw them back.

The *golden candlestick* was the richest utensil in the Jewish tabernacle. It was made of solid gold, and weighed a talent; and, according to Cumberland, the value of it, exclusive of the workmanship, was 5076 pounds. It contained seven lights, six branching out in three parts on each side of the upright stem, and one on the top of it. Each branch was adorned with cups, knobs, and flowers, alternate and equidistant; and on the top of each was fixed a lamp, in form of an almond, which might be put on or taken off occasionally; and in these were put the oil and the wick, or the cotton, which was drawn in and out by tongs or snuffers; under them were snuff-dishes for receiving the sparks, or refuse of the oil that fell from the lamps. This candlestick was placed in the antichamber of the sanctuary, on the south side, and served to illuminate the altar of perfume, and the tabernacle of the shew-bread: and it was the business of the priest to light the lamps every evening, at the time of incense, and to extinguish them at the same time

every morning. In Solomon's temple there were ten golden candlesticks of the same form with that described by Moses; five on the north, and five on the south side of the holy place. But after the Babyionish captivity, the golden candlestick was placed in the temple, as it had been before in the tabernacle of Moses; and when the Temple was destroyed, it was deposited in the Temple of Peace, built by Vespasian; and the representation of it still remains on the triumphal arch, at the foot of mount Palatine, on which Vespasian's triumph is delineated.

CANDLESTICK, *water*, a kind of jet or fountain raised on a foot which supports a little basin resembling the disk of a candlestick, down which the water falls into another larger basin.

CANDO, **CUNDI**, or **CONDI**, in *Commerce*, a long measure used in several parts of the East Indies, particularly at Goa, the capital of the Portuguese settlements there.

Silk and woollen stuffs are measured by the *varre*, and linen by the *cando*. The *cando* used in Pegu is equal to the Venetian ell.

CANDOLLEA, in *Botany*, a genus formed by Mirbel for some species separated from *acrostichum*.

Gen. Ch. Fructification disposed regularly in dots: involucre lodged in small cavities. It contains *A. heterophyllum*, *lanceolatum*, and *polypodioides* of Linnæus, and *A. longifolium* of Burman, all natives of the East Indies. See **ACROSTICHUM**.

CANDUARRE Corle, in *Geography*, a district or county in the south-eastern part of the island of Ceylon. See **CEYLON**.

CANDURA, a cape of the island of Rhodes, which forms with cape Tranquillo, the most considerable and the most southern promontory of the island, a large open bay. A river also, bearing the same name, discharges itself into the sea, in the vicinity of this cape, after watering the interior parts of the island.

CANDY, a very considerable province in the island of Ceylon, situate in the centre of the island, and formerly honoured with the royal residence. The king still holds his court there; and though all the other provinces have been more or less encroached upon, no part of Candia has ever been reduced to permanent subjection under a foreign power. The European dominions, however, which lie towards the coast, completely encircle the territories of the king of Candy, that occupy the greater part of the interior of the island. But since the Candians have been driven by their invaders into the mountains of the interior, it has been their policy carefully to prevent any European from seeing those objects which might tempt the avarice of his countrymen, or from observing the approaches by which an army could penetrate their mountains. If an European by any accident was carried into their territories, they took every precaution to prevent him from escaping; and the guards stationed every where at the approaches, as well as the wide and pathless woods which separate the interior from the coast, rendered such an attempt almost completely desperate. The dominions of the native prince are cut off on all sides from those occupied by the Europeans, by almost impenetrable woods and mountains. The passes which lead through these to the coasts are extremely steep and difficult, and scarcely known even to the natives themselves. Beyond the woods and mountains the country presents a scene widely differing in soil, climate, and appearance from that which lies within 10 or 20 miles from the sea-coast; and it seems to have advanced but a few steps beyond the first state of improvement, when compared with the highly cultivated fields, not far distant, which surround Columbo. The country gradually rises toward the centre of the island, and the woods and mountains that separate its several parts become more steep

and impervious. In these fastnesses the native prince still preserves those remains of territory and power, which have been left him by successive invaders. His dominions are of course much reduced in size; for beside the whole of the sea-coasts, which were of any value, the Dutch, in their various attacks during the last century, have contrived to get into their power every tract from which they could derive either emolument or security. Those provinces which he still retains are Noureculva and Hotcourly, towards the north and north-west; while Matuly, comprehending the districts of Bintana, Velas, and Panoa, with a few others, occupies those parts that lie more to the eastward. To the south-east lies Ouvah, a province of some note, which gives to the king one of his titles. The western parts are chiefly included in the provinces of Cotemaland Hotteracorley. These different provinces are subdivided into "corles," or districts, and entirely belong to the native prince. In the highest and most central part of the native king's dominions lie the "corles," or counties of Oudanour and Tatanour, in which are situated the two principal cities. These countries take the pre-eminence of the rest, and are both better cultivated, and more populous than any of the other districts; and they are distinguished by the general name of "Condé Udda;" "condé," or "candé," in the native language signifying a mountain, and "udda" the greatest or highest. This province of Condé Udda is even more inaccessible than the others, and forms a kind of separate kingdom of itself. On every side it is surrounded by lofty mountains covered with wood, and the paths that lead to it are little more than the tracts of wild beasts. Guards are stationed all round it to prevent both entrance and escape. The chief cities are Candy, Digliggy Neur, and Nilemby Neur, which see. The ruins of other towns, apparently larger and better built, prove that the kingdom of the Candians was once in a more flourishing condition, and gradually tending, by the natural course of things, to civilization and opulence, when the invasion of the Europeans deprived them of all those means by which they could have access to foreign nations, and an opportunity of importing either arts or manners into their own. In the northern part of the kingdom lies the province of Nour Calava, where may still be discovered the ruins of the once famous and splendid city of Anurodgburro; standing almost at the northern extremity of the Candian dominions, and bordering on the province of Jafnapatam. In former ages this was the residence of the kings of Ceylon, and has for a long time been the place of their burial. Tradition reports, that they reigned in regular succession for 90 generations of the same family, from the time of the flood, and that they lived to a great age, like the ancient patriarchs. After their death they are supposed to have been carried up to heaven, and to have been since employed as tutelary deities to the inhabitants of the island. They were revered as deities, and all buried in a large temple, or tomb, near their ancient city of Anurodgburro, the remaining vestiges of which indicate an uncommonly excellent architecture for the age in which it was erected. In the vicinity of this town stood formerly the stately temples and pagodas of the Ceylonefe worship, as appears by the maffy pillars and hewn stones which still remain. The Portuguese, when they became masters of the town, sacrilegiously destroyed its religious edifices, and transported the choicest materials to fortify Columbo and the other towns which they erected on the sea-coasts;—an act which the Ceylonefe still record with horror. The whole of the king's country, the plains around Anurodgburro excepted, present a constant interchange of steep mountains and low vallies. The excessive thickness of the woods, that cover the greatest part of the country, occasions heavy fogs and unwholesome damps. The vallies are generally marshy, and

C A N D Y.

abounding with springs, which excellently adapt them to the cultivation of rice and the rearing of cattle. The insalubrity of the climate, after the rainy season, counteracts these advantages. The principal difference between the climate of the interior and that of the coasts is occasioned by the stagnation of the atmosphere in the former. The depth of the vallies and the thickness of the woods concur in preventing the free circulation of the air; so that the night is constantly attended with very cold damps, which are succeeded by days equally noxious on account of their hot and sultry vapours. Hence it happens, that an European on coming to the interior is very subject to the hill or jungle fever; a disease resembling our ague and intermittent fever, accompanied with a violent dysentery, which never leaves the person attacked till he removes to the sea-coast, where the climate is more cool and refreshing in the day, and more free from the cold and damps of the night. The country of Candy can never derive any improvement from internal navigation; as the several large rivers that intersect it are rendered, during the rainy season, so rapid and impetuous by the torrents which fall into them from the surrounding hills, that no boat can venture upon them, while in the opposite they are almost completely dried up. Its largest rivers are the *Mahavaganga* and *Mulivaddy*, which see. The rainy season varies in different parts of the interior. The S.W. quarter is subject to the influence of the western monsoons, while the N.E. is but slightly touched by those from the opposite quarter. The high range of mountains that crosses the country of Candy divides the island into two different climates; so that there has been a continued drought on one side of them for years, while it has rained on the other without intermission. The eastern parts are less subject to the influence of the monsoons than those to the west, and consequently much less deluged with rains. Among the mountains of the interior, the seasons do not exactly correspond to either of the monsoons; and among them it rains incessantly in March and April, at which period it is dry in the low lands.

The disposition and character of the Candians derive their cast from their situation. Although they are subject to complete despotism, they are proud of being free from a foreign yoke, and of being slaves only to a master of their own race. They are in their air and aspect grave and haughty, and regard with contempt the Cinglese in our service, as a mean despicable race, who barter their natural rights for peace and protection. Nevertheless, they are more courteous and polite, and at the same time more crafty and treacherous than their countrymen of the low-lands. They are also more athletic, and being accustomed from their infancy to bear arms, and to watch the different posts where danger is apprehended, they acquire a military air, which distinguishes them from the Cinglese. Their houses are also neater and better built. The dress of the higher order of the Candians consists of several folds of cotton cloth, or calico, drawn close round their waists; while another piece, after being wrapped round the body, is tucked up at the back by one end, and by the other drawn together between the legs, or hanging down straight to the ancles: their arms, shoulders, and chest are bare. On their heads they wear a sort of turban, broad and flat at the top, narrow towards the lower part, and stiffened with "conjee," a species of starch made of rice. Over their shoulders, or round their waists they wear a belt, to which a dagger or short hanger is suspended. Before them they wear a purse, which holds betel leaf, areka-nuts, and tobacco; and they are commonly attended by a boy, with an ivory or tortoise-shell box filled with these articles. They constantly use an umbrella of talipot-leaf when they walk abroad in the day.

They all wear rings on their fingers; but are prohibited by royal authority from using them in their ears. The chief distinction, with regard to dress, between the higher order of the Candians and the Cinglese, consists in the form of the cap, and the immense quantity of cloth worn round the waist of the former. The dress of the lower orders among both is in every respect the same, the distinction of the cap excepted. The Candian men in general are better dressed than the Cinglese, and also fairer in their complexion. The women are not easy of access to the Europeans: but it is said, that there is no material difference in the manners, appearance, or dress of the Candian and Cinglese females.

The Candians are distributed into different classes, scrupulous of their respective precedence. The first class comprehends the nobles, who never contaminate their blood by intermarriage with persons of an inferior rank. This class is known by the name of "Hondrewa." The next rank includes artists, as painters, smiths, carpenters, and goldsmiths. Their dress is the same with that of the Hondrews, but they are not permitted to eat with the nobles, or to mix in their society. Those who are employed in the lower occupations, as they are deemed, of barbers, potters, washers, weavers, &c. form a third cast, with which the common soldier ranks. The fourth cast includes the peasantry and labourers of all descriptions, who either cultivate the land for themselves, or are forced to work for others. All these four casts continue unmingled; the son pursuing the profession of his father from generation to generation. Besides these casts, there is in Candia, as well as in other parts of India, another wretched class, consisting of such, who by any crime or neglect of superstitious rites have, according to the decree of the priests, forfeited their cast, and are condemned to infamy, pertaining to themselves, and entailed on their descendants through all generations. None of any other cast will intermarry with them; they are not allowed to exercise any trade or profession, nor to hold intercourse but with such as themselves; and if they accidentally touch any thing, it is reckoned polluted and accursed. Not allowed to work, they are reduced to the necessity of begging for their subsistence. These unhappy people are obliged to pay the lowest of the Candians as much reverence as eastern servility ordains the latter to pay to their sovereign.

The government of Candy is an absolute despotism, and resistance to the will of the king is attended with certain and immediate destruction. Nevertheless, the Candians hold in veneration fundamental laws of remote antiquity, the violation of which renders the sovereign amenable to the justice of his country as well as the meanest subject. By these fundamental laws the monarchy is elective, and the people may set aside the next branch of the royal family, and elect the more distant, or even a stranger; though the throne has been in general, for many ages, possessed by the ancient Candian royal family, which is now very nearly extinct. The king of Candy yields to no eastern prince in the number and extravagance of his titles, which it is needless to recount. They claim, however, from his subjects corresponding reverence. No one dares approach him without prostrating himself three times before the throne, and at each act of prostration reciting his titles. Persons of the highest rank are prohibited from coughing or spitting in his presence, and every one maintains before him inviolable silence. His progress, however, is always attended by a number of performers on various instruments, such as tom-toms, or drums of various sizes, shrill and squalling clarionets, pipes, flageolets, a sort of bag-pipes, and pieces of brass and iron jingled by way of triangles. Among

other attendants of the monarch are people furnished with long whips, made of hemp, coya, grafs, or hair, with a thong or lash 8 or 12 feet in length, without any handle; and whose business it is to run before the procession with strange gestures, in order to clear the way, and to announce his majesty's approach. As the government is despotic, all sorts of promotion depend on the king's pleasure; nevertheless, respect is uniformly manifested to the institution of casts, and officers of a certain rank must always be chosen out of a certain class. The king's regular troops, or standing army, are always near his person, and do duty in the interior; while the defence of the frontiers is entrusted to the adjoining inhabitants, who form a sort of militia, and watch over the entrances into the country. The highest officers of the state are the "Adigars," or prime ministers, two in number, who share the whole power of the court. These are usually selected from opposite factions, and of different dispositions, to prevent an union which might overwhelm the royal power. The adigars are the supreme judges of the realm; before them all causes are brought, and they pronounce final judgment; though from their sentence an appeal, seldom of any avail, lies to the king himself. The distinguishing badge of the adigars consists of a certain number of officers, who compose their train, and who carry a sort of staves, and a seal of hard clay, indicating the king's commission, and never failing to demand obedience to any mandate that is issued. The embassies to the European government at Columbo are entrusted to these prime ministers; and they are also charged with the reception of our ambassadors. Next in rank to the adigars are the "Dissauvas," who are the governors of the "corres," or districts, and also the principal military commanders: they attend the king's person, collect the revenues, and maintain order and discipline. But though they possess great authority, as well as the other officers of state, none of them are allowed to punish capitally without the cognizance of the king, whose exclusive prerogative it is to pronounce sentence of death. The dissauvas, whilst they retain their office, are allowed by the king a certain portion of land for their services; but under pretence of collecting contributions for their royal master, they are chargeable with grievous oppression. Subordinate to these are inferior officers resident in the several districts in which they are appointed, as their superiors generally reside at court and attend the person of the king. To these again there is another inferior rank of officers, who fulfil the duties of constables and police officers. The whole plan of government forms a regular system of oppression, which is severely felt by the lower orders of the people, whose property is wholly at the mercy of the rapacious officers of the court.

The principal revenues of the king arise from presents or contributions brought him by the people, or rather irregularly enforced by his officers, two or three times a year. These contributions consist of money, precious stones, ivory, cloth, corn, fruit, honey, wax, arms, and other articles of their own manufacture, as spears, arrows, pikes, targets, talipot-leaves, &c. The oppression principally experienced by the lower classes of the people is also extended to persons of superior rank. On certain festivals observed in great state, all the "Mahondrews" and principal people are required to attend, and none must approach the royal presence empty-handed. After depositing their presents at the palace-gate they are admitted into the presence of the king, and received according to the value of their offering. Besides these stated modes of extortion, there are others no less oppressive. Any person who is known to possess any articles of value is required to impart a

portion to the royal treasury; and artists are frequently employed by the king to manufacture for him arms and different articles in silver and gold, altogether at their own expence. All the Candians are obliged to take arms without distinction at the command of the sovereign. His regular troops, as they are called, may consist of about 20,000 men. Like other despots, who are afraid to trust their own subjects, the king always keeps about his person a body of Malabars, Malays, and others who are not his own natural subjects. In these he reposes his chief confidence, and he employs them as his constant body-guard. Beside this corps of foreign guards, who do perpetual duty at the royal palace, about 8000 of his regular troops and a number of the nobles are quartered in the neighbourhood, ready to be assembled at a moment's notice. The rest of the military force lies scattered through the country. Their pay and subsistence consist of a small allowance of rice and salt, a piece of cloth annually given for their dress, and an exemption from taxes and all other services, and a small piece of ground which they cultivate for their maintenance. The usual military punishment is compulsion to level a piece of hill, or clear the channel of a river. For more trivial offences the soldiers are curtailed of their pay and allowances. Distrust and jealousy, the constant attendants of arbitrary power, pervade the whole military system. Officers are encouraged by the king to act as spies against each other, and they are forbidden to correspond, or even to see each other, except at times when public exigency requires their being assembled. They are chiefly prevented from forming any intercourse or combination with Europeans; and for this purpose a continued chain of posts and watches is established around all the outskirts of his dominions. This system of vigilance is so strictly observed, that no one is permitted to pass from one district to another without examination and a passport, bearing different impressions according to the profession of the bearer. The natives universally travel on foot; riding on horseback being a royal privilege, seldom used by the monarch himself. No horses indeed are kept in the interior except those belonging to his majesty: nor are any horses reared in the interior. The Candians have no fixed and established laws; though they boast of an ancient code, which remains in the hands of the king, who is its sole interpreter. His authority supercedes every other decision. The trials of the Candians are summary; and their punishments, unless the king interposes, immediate. Their capital punishments are always attended with some circumstances of aggravation; such as having the criminal dashed to pieces by elephants, pounding him in a large mortar, or impaling him on a stake. Imprisonment is a species of punishment never inflicted on a Candian; and every species of confinement conveys ideas peculiarly horrible to their imagination. The great safe-guard of justice among the Candians is the natural mildness and honesty of their dispositions, in which they excel all other Indians. The Candians, precluded from intercourse with foreign countries, and proud of immemorial independence, might be supposed to enjoy amidst their native mountains and woods, a life of tranquillity and happiness, not to be found among those busy nations, that are inflamed by luxury and agitated with the thirst of gain. But this is far from being the case. The oppression of their governors, the constant dread of Europeans, and the superstitious fears arising from the nature of their climate, by which they are continually haunted, deprive this isolated people of all the enjoyments which seem congenial to their situation. Much of the gloom that overhangs the minds of the Candians originated with the oppressive exactions and destructive inroads of the Dutch. It is to be hoped, says Captain Percival, that our countrymen, by a generous and well regulated policy, will speedily diminish their sources of unhappiness.

Percival's

C A N D Y.

Percival's Account of the Island of Ceylon, 4to. 1805.
See CEYLON.

CANDY, the capital of the king of Candy's dominions and the royal residence, is situated in the district of Tatanour, in the midst of lofty and steep hills covered with thick jungle. The narrow and difficult passes, by which it is approached, are intersected with thick hedges of thorn; and hedges of the same sort are drawn round the hills in the vicinity of Candy, like lines of circumvallation. The only passage through these is by gates of the same materials, called by the natives "Caravetties," and so contrived as to be drawn up and let down by ropes. When the Candians are obliged to retreat within these barriers, they cut the ropes, and then it is impossible to force a passage except by burning down the gates, which, from their green state, and the constant annoyance of the enemy, would prove an enterprise of some time and difficulty. These hedge-rows form the chief fortifications of Candy. The river Malivagonga also nearly surrounds the hill on which it stands: the river is here broad, rocky, and rapid; a very strict guard is kept on it, and every one who passes or repasses is closely watched and examined. Although the caravetty nearest Candy has a rampart or breast-work, on which some of their artillery is occasionally mounted, it could make but a feeble resistance to the approach of a regular army; so that Candy is indebted for its principal fortifications to nature. The city itself is a mean and miserable place, surrounded by a mud wall of no strength. Our chief knowledge of this city is derived from the embassy of general Macdowal, deputed to the king of Candy by governor North, in the year 1800, of which captain Percival has given a journal, in an appendix to his account of Ceylon: but the information thus obtained must necessarily be imperfect; as the ambassador and his suite were admitted only by torch-light, and always retired before break of day. From what they could observe the city consists of a long straggling street built on the declivity of a hill, about two miles long, with lesser streets branching off on both sides: the houses were mean and low, chiefly of mud, but their foundations were raised about 5 feet above the level of the street, so that they appeared lofty to passengers. The reason of this mode of construction is to enable the king to hold his assemblies of the people, and to have his elephant or buffalo fights in the street without interfering with the houses. Some of the houses at the upper end of the street, belonging to the principal inhabitants, are tiled and white-washed. When the king passes along the street, none of the inhabitants are allowed to appear before their houses or in the paths on a level with them, as this would be attended with the heinous indecorum of placing a subject higher than the prince descended of the sun. At the upper end of this street stands the palace, built of a kind of cheenan or cement perfectly white, and containing a great number of rooms, the walls of which are painted in a grotesque manner, and covered with inscriptions: in one room is a gigantic figure of brais of Buddou in a sitting posture, with two smaller ones at his feet. The palace is surrounded with high stone walls, consisting of two squares, one within the other. In the inner of these, to which there is access by a large arched gateway, are the royal apartments, where the court is held, and audiences are given. The hall of audience, or state-room, is a long viranda, with alternate arches and pillars along its sides, somewhat resembling the aisle of a church. At the farther end of this hall is placed a kind of platform or throne, covered with a carpet and surrounded with steps, where the king sits in state. His feet, and the lower part of his body are concealed from view by a small partition in front. On occasion of general Macdowal's re-

ception, the courtiers were seen below the arches on each side of the hall, some prostrate, others sitting in silence and cross-legged. The king was dressed in a robe of fine muslin, embroidered with gold, drawn close in several folds round the waist, and flowing from thence down like a lady's gown. His arms were bare from the elbows downwards. On his fingers were many broad rings set with precious stones of different sorts, and a number of gold chains were suspended round his neck over a stiff frilled piece of muslin resembling Queen Elizabeth's ruff. His head was covered with a turban of muslin spangled with gold, and surmounted by a crown of gold, by which he is distinguished from all the other Asiatic princes. Round his waist was a rich sash, from which was suspended a short curved dagger or sabre, with the handle richly ornamented, and the scabbard of gold fillagree-work. During the conference, which lasted three hours, rose-water was frequently sprinkled round from curiously wrought vessels of gold; and perfumes were handed about on salvers of gold and silver fillagree-work. To one proposal made on this occasion, viz. that leave might be given to make a road, and to open a communication from Trincomalee to Columbo through the territories of the king a little north of Candy, he peremptorily refused to accede; but he expressed his decided aversion from any intercourse or connexion existing between his subjects and the Europeans; professing at the same time a desire to live on amicable terms with the British, whose power he acknowledged to be far superior to that of the Dutch. On January 31st, 1803, general Macdowal began his march with a considerable force into the Candian territory, and on the 20th of February, after encountering many difficulties, arrived at Candy. The king and his chief adigar precipitately withdrew, after having set fire to the palace and the temples. The British troops soon extinguished the fire, and took possession of the city. Although the Candians soon afterwards appeared in considerable force, they were quickly dispersed after a dreadful slaughter. Before the British general left Candy, he adopted various measures to secure his new conquests. After some time, viz. in June, 1803, when it was thought tranquillity was established, and in the midst of a truce, Candy was attacked by the natives under the command of the first adigar; and the commanding officer, whose troops were become unfit for duty by the sickness that prevailed among them, was under a necessity of capitulating, and of evacuating the fort, under a solemn stipulation that the garrison should be allowed to proceed, with arms and ammunition, and without molestation to Trincomalee, and that the sick should also be taken care of. In defiance of this agreement, after the commanding officer left the fort, all the English soldiers who accompanied him were treacherously murdered. Shortly after this massacre, the king of Candy, finding that the British force on the island was weak, determined to attack our forts on the coast; but all his efforts were ineffectual; and the British settlements were soon restored to security. Candy, or Kandi, lies in the centre of the country, 80 miles distant from Columbo, and about 160 miles from Trincomalee. N. lat. $7^{\circ} 18'$. E. long. $80^{\circ} 46'$.

CANDY, in speaking of *Sugar*, denotes a preparation of that substance, made by melting, and crystallizing it six or seven times over, to render it hard and transparent. See SUGAR.

CANDY-tuft, in *Botany*. See IBERIS.

CANDYBA, in *Ancient Geography*, one of the most considerable towns of Asia Minor in Lycia, which, according to Steph. Byz. derived its name from Candybus, son of Deucalion.

CANDYING, denotes an operation in *Pharmacy*, as well

well as *Confectionary*: those simples which are preserved in substance by boiling in sugar being said to be *candied*: though the performance of it is now transferred to the confectioner from the apothecary, to whom it originally belonged.

CANDYS, in *Ancient Geography*, a town of Asia; in Media. Ptolemy.

CANE, in *Botany*. See ARUNDO *Bambos*, or *Bamboo*.

CANE, *sugar*. See SACCHARUM.

CANE, in *Commerce*, the same with reed, called among botanists ARUNDO, which see.

Canes make a considerable article in commerce. There are imported two sorts, viz. *walking* and *rattan canes*.

CANES, *walking*, are said by Bradley to be joints of the roots of a sort of reed, called *canna Indica*. This plant shoots in joints of about three or four feet long, near the surface of the ground, and at every knot produces great numbers of fibres, by which it receives its nourishment. The joints are made straight by the fire, which occasions those shades or clouds frequently seen in them. Bradley thinks the cane-tree might be propagated here by planting some of the roots with their knots in artificial bogs, &c.

Canes may be stained like tortoise-shell, by a mixture of aqua fortis and oil of vitriol laid on them at several times over live coals, to cause it to penetrate the deeper, and afterwards giving them a gloss with a little soft wax, and a dry cloth. Boyle.

CANES, *rattan*, are a smaller sort brought from China, Japan, and Sumatra, very tough; which being split, are used for making of cane chairs. They are the produce of a reed called *rattang Malabarica minor*, or lesser rattan. The specific name is rotang, whence rattan, and in the Malayan language signifies a staff or walking stick. These when dry, being struck against each other, will give fire, and are used accordingly in some places in lieu of flint and steel. Being twisted together they make cordage of them. The Chinese and Japanese vessels are said to have their cables made of them, which are less liable to rot in the water than hemp. Phil. Trans. N° 244, p. 326, and N° 267, p. 717. See CALANUS.

The canes, or canas, in the jurisdiction of Guayaquil in South America, are remarkable for both their length and thickness, and the water contained in their tubes. Their usual length is between 6 and 8 toises; and the largest do not exceed 6 inches in diameter. The wood or side of the tube is about 6 lines in diameter; so that when the cane is opened, it forms a board near $1\frac{1}{2}$ foot in breadth; and, therefore, it will not appear strange that houses should be constructed of such materials. From the time of their first appearance, till they attain their full perfection, when they are either cut down, or of themselves begin to dry, most of their tubes contain a quantity of water, with this remarkable difference, that at full moon they are entirely, or very nearly, full, and with the decrease of the moon, the water ebbs, till at the conjunction little or none is to be found. During its decrease, the water appears turbid; but about the time of full moon, it is clear as crystal. The water is found to be an excellent preservative against the ill consequence of any bruises; at least it is drunk by all who come from the mountains, where such accidents are unavoidable. The canes, being cut, are left to dry, or, as they say, to be cured; whence they acquire such a degree of strength, that they serve for rafters, beams, floorings, or even masts for balzas. Ships which load with cocoa are also cased with them, to preserve the timber from the great heat of that fruit. They are also used as poles for litters, and in a variety of other ways. Juan and

De Ulloa's voyage to South America, by Adams, vol. i. p. 209.

CANE, *fishing-rod*. See REED.

CANE, *Indian*. See CANNA.

CANE-apple, in *Natural History*, a name given by the common people of Ireland to the *arbutus*, or strawberry-tree. See ARBUTUS.

CANE, CANNA, a long measure, frequent in Italy, Spain, and the south parts of France; of greater or less length, according to the places where it is used. It is called by the Latins *calemus*, and in scripture a *reed*.

At Naples, the canna is equal to seven feet $3\frac{1}{2}$ inches, English measure; the canna of Thoulouse, and the Upper Languedoc, is equal to the *vara* of Arragon, and contains five feet $8\frac{1}{2}$ inches; at Montpellier, in Provence, Dauphiné, and the Lower Languedoc, to six English feet $5\frac{1}{2}$ inches.

CANE, in *Ancient Geography*, a port-town of Arabia Felix, attributed by Ptolemy to the Adramites, who formed a class of the Sabæans.—Also, a promontory near this town, on the Red Sea.—Also, a promontory of Asia minor, near the Caicus.

CANE, in *Geography*, a river of Hindoostan, which runs into the Jumnah, 20 miles S.E. of Corah.

CANE, in *Rural Economy*, a term sometimes used to signify a hollow place where water stands. It also implies a wood of alder, or other aquatic trees, in a moist boggy situation.

CANEA, in *Geography*, a maritime town of the island of Candia, or Crete, situate at the eastern extremity of a large bay, on the north side of the island, and supposed to have been built on the site of Cydonia, a flourishing city of ancient Crete, although no vestige of ancient edifices be now perceived. Canea, after resisting the efforts of the Ottoman army consisting of 60,000 men for 50 days, during which siege the Turks are said to have lost 25,000, was compelled to capitulate in the year 1645. Although it is much less extensive than Candia, the capital, it is the most populous and the most trading town of the whole island. In this place are reckoned upwards of 4000 Turks, 2 or 3 thousand Greeks, 150 Jews, 4 French houses, and some Italian houses, which latter are under the protection of the emperor of Germany, or the republic of Ragusa. The form of its buildings resembles that of the houses of the East: in lieu of roofs, inclined and forming a ridge, they have a flat covering without tiles or slates, and constituting a terrace: most of them have only one story. The streets are laid out by the line; some of them are tolerably wide; in the public squares are fountains that flow with an abundant stream. The town is surrounded by a strong wall and a wide ditch. It has but one gate on the land side. The harbour is defended by batteries in a good condition. To the left, on entering, is seen a jetty parallel to the coast, behind which a considerable number of vessels might anchor if the bottom were cleaned. The largest are obliged to remain near the entrance of the harbour, exposed to the waves of a rough sea when the northerly winds blow with violence. If during these northerly gales, they happen to have run into it, it is not possible for them to get out; but they are obliged to steer for the very narrow mouth of the harbour, where the waves rise in heaps and frequently so high as to clear the mole, and to spread and break in the basin. This basin, through the negligence of the Turks, is choked up: it can scarcely admit vessels of 200 tons burden: the arsenal and fine docks which the Venetians had constructed opposite to the jetty are falling into ruins and unfit for use. In the environs of Canea, there are some beautiful plains that are tolerably fertile and almost entirely cultivated; and they

present

present to view gardens of orange-trees, forests of olive-trees, a few scattered vineyards, and fields appropriate to the culture of wheat, barley, cotton, sesamum, maize, melons, and different legumes. On the west of the town, beyond the little desert island of *San Theodoro*, on which the Venetians had erected a battery for preventing a descent on the beach, is situate *Platania*, an extensive, solitary, and rural walk, where grow spontaneously plane trees that excite astonishment by their size and number. Each of these supports one or two vine-plants, which embrace the whole compass of the tree, and furnish in abundance, without care or culture, grapes with large stones of an excellent quality. A small river also traverses and waters this agreeable forest. The banks of the rivulets in the vicinity of Canea are commonly covered with oleanders and myrtles; and a great variety of trees bearing fruit, and of plants perfuming the air with their flowers, render the environs of this town peculiarly pleasant and inviting. The famous *fraxinella* or dittany of Crete, celebrated by the ancients, profusely clothes the rocks in the neighbourhood. It is collected by the peasants and formed into small bundles, and brought to the markets of Canea and other towns, where it is much esteemed for its permanent odour and other virtues that are ascribed to it. But the most useful productions, and those which yield the chief revenue of the town and pachalik of Canea, are the olive-trees, that yield a great quantity of fruit, from which is expressed an oil, forming an important branch of the commerce of Candia; although it is here badly manufactured: the inhabitants being ignorant of the art of refining it, and rendering it agreeable to the taste. It is purchased by the Europeans only for their soap-houses and manufactories. At Canea there are 20 soap houses, which employ the oils of the provinces of Kissamos, Selino, and Cidonia; and these are so plentiful, that the French houses established in this town dispatched to Marseilles, during the year of the gathering and the following, to the value of from one to two millions of French livres. About a quarter of a league to the east of Canea is a rising ground, leading to calcareous hills, which advance into the sea and form a peninsula terminated by Cape *Melecca*. Among these hills on a beautiful situation lies the monastery of the "Trinity," which is inhabited by a great number of friars, all of whom almost apply themselves to the culture of the land. In the environs of the monastery are some superb orchards of olive-trees, a few vineyards, and fields destined to the cultivation of different species of corn. Here are also many bees and a great number of goats and sheep. In the garden was seen a ricinus or palma Christi planted twelve years ago, which indicated by its vigour that most of the plants of the warmest climates might be introduced into this island. Further towards the cape lies the monastery of "St. John." In the vicinity of Canea are huts erected for the accommodation of persons infected with the leprosy, who are prohibited from all intercourse with healthful persons, and who subsist on the produce of a small garden adjoining to their cottage, or poultry they rear, and on the alms of passengers. On the edge also of the road that leads to the only gate which Canea has on the land side, are exposed the bodies of criminals, who have undergone the terrible punishment of empalement. They are ranged on each side of the road; and in this dreadful rank are seen men whose bodies are longitudinally transpierced by a stake, some dead; others expiring: some smoking their pipe with as much sangfroid as if they were sitting on cushions, railing at the Europeans, and living as long as 24 hours, in the most excruciating torments. In a field near Canea, Sonnini witnessed the dance, mingled with singing, called "Romeca" which the present Greeks have received

from their ancestors, and which they have preserved nearly with all its appendages. Canea is about 70 miles W. of Candia. N. lat. $35^{\circ} 28'$. E. long. $24^{\circ} 15'$.

CANEBEUM, in *Ancient Geography*, a town of Asia Minor in Caria, mentioned by Steph. Byz. who says, that it was also called *Cyon*.

CANEFIELD, in *Geography*, a town of North America, in the state of South Carolina; 6 miles N.N.W. of Queenborough.

CANELLA, in *Botany*. Murray Syst. Veg. 443. Schreb. 817. Willd. 942. Gært. 486. Vent. 3 p. 160. (Winterana, Linn. gen. 598. Juss. p. 263. Winterana, Lam. Illust. pl. 399. Venterane, Bos. nouv. dict.) Gen. Ch. Cal. one-leafed, deeply divided into three lobes; lobes roundish, concave, permanent. Cor. Petals five, longer than the calyx, oblong; nectary pitcher-shaped, the length of the petals. Stam. Filaments none; anthers twenty-one; (sixteen, Schreb. from 12 to 20. Gært.) linear, parallel, adhering longitudinally to the outside of the nectary. Pist. Germ. superior, within the nectary, egg-shaped, three-celled; style cylindrical, the length of the nectary; stigmas two or three, blunt, convex, wrinkled. Berry three-celled, one or two of the cells generally abortive. Seeds two, roundish-kidney-shaped. Eff. Ch. Calyx three-lobed. Corolla five petalled; anthers adhering to a pitcher-shaped nectary. Berry three-celled.

Sp. C. alba. Clus. exot. lib. 4. cap. 4. Swartz in Linn. Transac. vol. i. tab. 8. Woodville Med. Bot. p. 318. tab. 117. (C. peruana, and C. tubis minoribus alba, Bauh. pin. p. 409. 2, 3, and 4. Park theat. 1581. C. cubane, Johnst. dendr. 165. C. cinnamomea, Pluk. phyt. tab. 160. f. 7. C. winterana, Gært. fruct. tab. 77. fig. 2.) A tree. Stem from 10 to 50 feet high, straight, branched only at the top; bark whitish; branches erect, not spreading. Leaves petioled, alternate, but not regularly, oblong, acuminate, entire, thick, dark green, shining. Flowers in terminal, compound corymbs, violet, small, seldom opening; lobes of the calyx roundish, concave, incumbent, smooth, membranous; petals concave, erect, thick, deciduous. Berry globular, fleshy, smooth, black. Seeds fixed to the central angle of the cells, regularly two in each cell, but one or two cells are generally abortive, and sometimes only one discernible, of different shapes, according to the number of abortive germs and cells, always black, smooth, and shining. Swartz and Gært. The whole tree is very aromatic, and when it is in blossom perfumes the whole neighbourhood. The flowers dried and softened again in warm water have a fragrant odour, nearly approaching to that of musk. The leaves have a strong smell of laurel. The berries have a faint aromatic taste and smell, and are greedily eaten by the white-bellied and bald-pate pigeons (*Columba jamaicensis* and *leucocephala*), who acquire from them that peculiar flavour which is so much admired. Its bark, which in taste is moderately warm, aromatic, and bitterish, and has an agreeable smell, resembling that of cloves, was formerly a common ingredient in the food and drink of the Caribs, and at present is a necessary addition to the meagre pot of the negroes. It is brought to Europe in long quills, which are about three quarters of an inch in diameter, somewhat thicker than cinnamon, and both externally and internally of a whitish or light brown colour, with a yellowish hue, and commonly intermixed with thicker pieces, which are probably obtained from the trunk of the tree. Its virtues are extracted most powerfully by proof spirit. It has long superseded the use of the Cortex winteranus, with which it was confounded, first by John Bauhin, and afterwards by Linnæus, who, in the first edition of the Species Plantarum, united the two plants under the name of *laurus winterana*; but.

but in the ensuing editions made it a distinct genus, and called it *winterania*. The true codex winteranus brought by captain Winter from the straits of Magellan in the latter end of the 16th century, and described by Clusius, was, in consequence of this mistake, very rare, and imperfectly known in Europe for nearly a century, but has been recently brought again to light by the late Dr. Fothergill, with the assistance of the late Dr. Solander. See *WINTERA aromatica*.

The bark of *canella alba*, which has been received into the London and Edinburgh Pharmacopœias, instead of the old bark of Winter, has been supposed to possess considerable medicinal virtues, and to be an useful medicine in the scurvy and some other complaints; but is now considered merely as an aromatic, and is chiefly employed for the purpose of correcting, and rendering less disagreeable, the more powerful and nauseous drugs. It is, therefore, an ingredient in the Pulv. Aloet. Pharm. Lond. and in the Tinctura amara, Vinum amarum, Vinum rhei, &c. of the Pharm. Edinb. See Swartz's Botanical History of the *Canella Alba*, in the Transactions of the Linnæan Society, vol. i. p. 96. t. 2. p. 318. and Woodville's Medical Botany, vol. ii. p. 318. This tree is too tender to live in England out of a stove. It may be raised from fresh seeds procured from the West Indies, but is not readily propagated either by layers or cuttings.

CANELLA, in *Geography*, formerly called the *kingdom of Cota*, a large district of the island of Ceylon, containing a great number of cantons, principally occupied by the Dutch, and famous for the quantity of cinnamon, which it produces. It has several towns, forts, and harbours, on the coast. The interior is inhabited by the natives, and it has rich mines of rubies, sapphires, topazes, cats-eyes, and other precious stones.

CANELLA Alba. The *canella* of the *Materia Medica*, is the inner bark of the *canella*, (which see) a very common tree in the West Indies. This bark is brought over in long quills, much thicker than cinnamon, smooth, and brittle, and of a white or whitish yellow colour. To the taste it is extremely pungent, and somewhat bitter, and is not very grateful. It yields its sensible qualities both to water and spirit, and has the common chemical characters of all the aromatic barks. On account of its extreme pungency it is seldom used.

CANELLI, a town of Piedmont, in the county of Asti; 12 miles S.S.E. of Asti.

CANELOS, a town of Portugal, in the province of Trallos-Montes; 5 miles N.N.E. of Lamego.

CANEM, or **KANEM**, a name sometimes given to the country of Africa, called *Bornou*, which see. See also **KANEM**.

CANENTELOS, or **CARANTONUS**, *Charente*, in *Ancient Geography*, a river of Gallia Aquitanæ. Ptolemy.

CANENTES, in *Natural History*, a name used by some of the older writers for a species of fossil shell not known to us in its recent state, but described by Klein under the name of the *tubulus marinus concameratus*, and by other of the late authors under those of *polythalamium* and *orthoceratites*.

CANEPHORÆ, *Κανηφόραι*, from *κavns*, a reed, and *φερω*, I bear, in *Antiquity*, were two virgins of quality at Athens kept in Minerva's temple in the Acropolis, who at the feast of the Panathenæa, carried baskets on their heads with something secret or mysterious therein, and delivered to them by the priestess. The baskets were usually crowned with flowers, myrtles, &c.—The *canephoræ*, in these ceremonies, always marched the first, the priest next, and the choir of music followed.

The learned are at variance about the contents of the baskets borne by the *canephoræ*. Some will have it, that neither they, nor the priestess herself, knew what was in them. Others conjecture that they contained the things necessary for sacrifice, &c.

There were also *canephoræ* in the ceremonies of Ceres and Bacchus. Those in the Bacchanalia carried golden baskets, in which were divers sorts of first fruits, &c. Among ancient monuments, we find mention of divers figures of *canephoræ*. In that famous cornelian, called Michael Angelo's ring, there are three *canephoræ* with their baskets on their heads.

The appellation *canephoræ* was also given to virgins at Athens, when becoming marriageable, they presented certain baskets full of little curiosities to Diana, in order to procure leave to quit her train, and change their state of life.

CANEPHORIA was a ceremony, which made part of a feast celebrated by the Athenian virgins on the eve of their marriage day. The *canephoria*, as practised at Athens, consisted in this; that the maid, conducted by her father and mother, went to the temple of Minerva; carrying with her a basket full of presents, to engage the goddess to make the marriage happy: or rather, as the scholiast of Theocritus has it, the basket was intended as a kind of honourable amends made to that goddess, the protectress of virginity, for abandoning her party; or it was a ceremony to appease her wrath.

CANEPHORUS, in *Botany*, (*κανηφορος*, basket-bearing, so called from the shape of its compound flowers.) Juss. 208. Willd. 356. Bosc. nouv. dic. Clafs and order, *pentandria monogynia*. Nat. Ord. *rubiceæ*, Juss.

Gen. Ch. *Cal.* Perianth common tubular, toothed, inclosing from three to six sessile flowers on a chaffy receptacle; perianth partial, five or six-cleft. *Cor.* monopetalous, bell-shaped, five or six-cleft. *Stam.* Filaments none; anthers five or six, oblong. *Pist.* Stigma two-cleft. *Fruit* pea-shaped, inferior, two-seeded. Juss.

Ess. Ch. *Calyx* common tubular, toothed, many-flowered. *Perianth* five or six-cleft. *Corolla* bell-shaped, five or six-cleft. *Fruit* inferior, two-seeded. Willd.

Sp. 1. *C. axillaris*, Lam. Ill. Pl. 151. fig. 1. "Leaves roundish, egg-shaped; flowers solitary, axillary." Leaves opposite, narrowing into short petioles, entire. 2. *C. capitata*, Lam. Illust. Pl. 151. fig. 2. "Leaves lanceolate; flowers terminal, aggregate, involucre." Leaves opposite, nearly sessile; entire. *Flowers* three or four together; leaflets of the involucre numerous, bristle-shaped. Both species found by Commerçon in the island of Madagascar.

CANES, in Egypt and other Eastern countries, a poor sort of buildings for the reception of strangers and travellers. People are accommodated in these with a room at a small price, but with no other necessities; so that, excepting the room, there are no greater accommodations in these houses than in the deserts, but that there is a market near.

CANES Venatici, in *Astronomy*, the *Grey-hounds*, two new constellations, first established by Hevelius, between the tail of the Great Bear, and Bootes' arm, above the Coma Berenices. The first is called *Asterion*, being that next the Bear's tail: the other *Chara*. They comprehend 23 stars, of which Tycho only observed two. In the British catalogue they are 25.

CANESCENS, in *Entomology*, a species of *Apis* mentioned by Lepechin in his travels through Siberia. This insect is hoary, snout incurved, horny, projecting from a conic vesicle: abdomen with obscure blotches. Inhabits near the Caspian sea.

CANESCENS, a species of **CANTHARIS** found in Saxony. The thorax is yellow: sternum and elytra obscure cinereous. Schall.

CANESCENS, in *Ichthyology*, a species of **CHÆTODON** that inhabits South America and India. The tail of this fish is bifid: first and second ray of the dorsal fin spinous, the third very long; mouth bidentated. Gmel. Linn. Syst. &c. Figured by Seba, v. 3. pl. 25.

CANESCENS, in *Ornithology*, a species of **MOTACILLA**, that inhabits New Holland, the plumage of which is hoary-brown above, and white beneath; head black; front streaked with white; breast and vent lined with black; spot on the wings, and edge of the tail-feathers at the base tawny. Called by late writers the Van Diemen's warbler.

CANET, in *Geography*, a town of France, in the department of the Eastern Pyrenées; 5 miles E. of Perpignan.—Also, a town of France, in the department of Herrault; 10 miles S.E. of Lodeve.

CANETE. See **CAGNATE**.

CANETHUM, in *Ancient Geography*, a mountain of Greece in Bœotia.—Also a place of Greece, in the island of Eubœa.

CANETO, in *Geography*, a town of the duchy of Mantua, seated on the river Oglio; 20 miles W. of Mantua. N. lat. 40° 55'. E. long. 10° 45'.

CANEVAS, *Fr.* an outline for a poet or musician to colour. The French chiefly use the term in writing words to favourite airs in a ballet; which, after being danced to instruments, is impressed more deeply in the memory of the audience by being sung. The word seems to be used with more propriety when applied to a slow and pathetic air, left by the composer, as a mere sketch for the finger to grace and embellish. See **CANTABILE**.

CANFRANC, in *Geography*, a town of Spain, in Arragon, 3 leagues N. of Jaca.

CANGA, called by the Portuguese **CANGUA**, and in China *Cha*, in the *Chinese Police*, a wooden clog or collar borne on the neck, by way of punishment for divers offences.

The canga is composed of two pieces of wood notched, to receive the criminal's neck, and this frame of wood has also two small holes for the hands of the offender. The load lies on his shoulders, and is more or less heavy according to the quality of his offence. Some cangas weigh 200 pounds; but most of them from 50 to 60 pounds. It is a kind of permanent and ambulatory pillory, which the culprit is sometimes sentenced to wear for weeks or for months. The duration of this punishment for having broken the peace, or disturbed a family, or for being a notorious gambler, is generally three months. Although he is suffered to walk about, or stationed for a certain space of time either in some public square, or at the gate of a city or a temple, and occasionally to rest under this heavy and degrading burden; yet if the offender is thought by the subordinate officer of the civil magistrate to have rested too long, he is beaten with a whip made of leather thongs till he rises. The mandarins condemn to the canga. When the time of his punishment is expired, he is again brought before the mandarin, who exhorts him in a friendly manner to amend, frees him from the canga, and discharges him after he has received twenty heavy blows.

CANGANI, *promuntory is*, in *Ancient Geography*. See **CANCANI**.

CANGAREE, in *Geography*, a river of America, in South Carolina, formed by the union of the Saluda and Tyger; about 5 miles N.W. from Columbia.

CANGE, **CHARLES DU FRESNE DU**, in *Biography*, an eminent linguist and antiquary, was born in 1610, at Amiens,

where, after attending the bar for some time at Paris, he devoted himself to the study of the learned languages, and of ancient and modern history. In 1645, he obtained the post of treasurer of France; and continued at Amiens, blending literary avocations with the functions of his office, till a pestilence, which prevailed in his native city, in 1668, obliged him to remove to Paris, where he enjoyed peculiar advantages for the prosecution of his studies. Here he was held in high estimation for his extensive learning, for the modesty and diffidence with which he always expressed himself concerning his own talents and literary performances, and for the condescension and affability, which eminently distinguished his social intercourse. After having enjoyed, for 50 years, without intermission, a good state of health, he was seized, in 1688, with a retention of urine, which, in a few months, terminated his life. Of his learned works, which were numerous, the following are the principal; viz. "History of the Empire of Constantinople under the French Emperors," Paris, 1657, fol. "History of St. Louis, King of France, by the Sieur de Jonville, illustrated with new Remarks and historical Dissertations, &c." Paris, 1668, fol. "Joannes Cinnamus's Six Books of the History of the Affairs of John and Manuel Comnenus, Gr. and Lat. with historical and philosophical Notes, &c." Paris, 1670, fol. "A Memoir upon the Plan of a new Collection of the Historians of France," inserted in Le Long's *Bibliothèque Historique de la France*. "Glossarium ad Scriptores mediæ et infimæ Latinitatis, &c." Paris, 1678, 3 vols. fol.; Francof. 1681 and 1710, 3 vols. fol.; reprinted in 1733, by the Benedictines of St. Maur, and augmented with 4 new volumes by the abbé Carpentier. To this work Du Cange owes his chief reputation. It is of singular use to those who study the writings and records of the middle ages, and abounds with many interesting and amusing anecdotes. "Cyrilli, Philoxeni, alterumque Veterum, Glossaria, Latino-Græca et Græco-Latina," 1679, fol. "Historia Byzantina, duplici Commentario illustrata, &c." Paris, 1680, fol. containing the genealogies of the emperors of Constantinople, and an accurate description of the state of that city under these emperors. "Joannis Zonaræ Annales ab Exordio Mundi ad Mortem Alexii Comneni, &c." Paris, 1686, 2 vols. fol. "Glossarium ad Scriptores mediæ et infimæ Græcitatibus; accedit Appendix ad Glossarium mediæ et infimæ Latinitatis, unâ cum brevi etymologico linguæ Galliæ ex utroque Glossario," Paris, 1688, 2 vols. fol. "Chronicon Paschale a Mundo condito ad Heraclii Imperatoris annum vigesimum," Paris, 1689, fol. Whilst this work was in the press, the learned author died; and it was completed and published by M. Baluze. His MSS., which were numerous, are preserved in the king's library. Gen. Dict. Nouv. Dict. Histor.

CANGI, **CEANGI**, or **CANGANI**, in *Ancient Geography*, a people of Britain, concerning whose situation antiquarians have been much perplexed. Camden discovered some traces of them in many different and distant places, as in Somersetshire, Wales, Derbyshire, and Cheshire; and others have found as plain vestiges of them in Devonshire, Dorsetshire, Essex, Wiltshire, &c. Mr. Baxter, (*Gloss. Brit.* p. 73, &c.) seems to have discovered the true cause of this perplexity, by observing that the Cangi, or Ceangi, were not a distinct nation seated in one particular place, but such of the youth of many different nations as were employed in pasturage, in feeding the flocks and herds of their respective tribes. Almost all the ancient natives of Britain had their Ceangi, the keepers of their flocks and herds, who ranged about the country in great numbers, as they were invited by the season, and plenty of pasture for their cattle. Hence we find traces of

their name in many different parts of Britain; but chiefly in those parts which were best adapted to pasturage. These Ceangi of the different British nations, naturally brave, and rendered still more hardy by their way of life, were constantly armed for the protection of their flocks from wild beasts; and these arms they occasionally employed in the defence of their country and their liberty.

CANGIAGIO, or **CAMBIASO**, **LUCA**, called **LUCHETTO**, in *Biography*, one of the most eminent of the Genoese painters, was born at Oneglia, near Genoa, in 1527, and, being of a volatile disposition, was laid under restraint by his father, who was his teacher in the art of painting. At the age of 17, he was employed in painting the front of a house in fresco; but whilst he was commencing his work, some Florentine painters who were actually engaged, conceived him to be a mere grinder of colours, and when he took up his pallet and pencils, they wished to have prevented his proceeding with it, lest he should spoil the work. However, after a few strokes of his pencil, they were convinced of their mistake, and respected his singular abilities. In the exercise of his art, he was uncommonly expeditious and rapid, and as he worked equally well with both hands, his performances were numerous and speedily executed. Of Cangiagio it is remarked, that he practised three different modes of painting at three different periods of his life. His first manner was gigantic and unnatural, which he corrected, in consequence of the remonstrances of his friend Alessi, the celebrated architect, for his best style, in forming which he consulted nature with attention, and digested his thoughts in sketches, before he began to paint. His third manner was distinguished by a more rapid execution, to which he recurred in order to make more ample provision for his wife and family. The death of his wife was followed by a violent passion for her sister, to whom he committed the care of his children. With a view of obtaining a dispensation from pope Gregory XIII., he took a journey to Rome, in 1576, and enforced his request by presenting two pictures to his holiness. The pope, however, insisted that he should dismiss his sister-in-law from his house. After this unsuccessful application, he prosecuted the exercise of his profession at or near Genoa, and performed some admirable works in the convent of St. Bartholomew of the Armenians. He was afterwards invited by Philip II. to adorn the Escorial; and he complied with the invitation, in hopes of interesting this powerful monarch in favour of his unallowed and disquieting passion. But the king's courtiers deterred him from communicating his request, much as his performances were admired, to a prince so religious. These repeated disappointments preyed upon his mind, and brought on a lingering complaint, which terminated in his death, at the Escorial, in 1585. "A great facility of hand, skill in drawing, especially fore-shortened figures, and fertility of invention, were the characteristic excellencies of this painter; but he failed in grace, selection, and the truth of nature." In the royal collection at Paris there are a "Sleeping Cupid," as large as life, and likewise "Judith with her Attendant," which do honour to this master. In the Pembroke collection at Wilton, there is a picture, representing Christ bearing his cross, which is ascribed to Cangiagio. D'Argenville. Pilkington.

CANGIAMILA, **FRANCIS**, **EMANUEL**, canon of the church at Palermo, and inquisitor of the island of Sicily, where he died, in 1763, published "*Embryologia sacra, five de officio sacerdotum, medicorum, et aliorum circa æternam parvulorum in utero existentium salutem*," Palermo, 1761, fol. By the canons of the church of Rome, it has been decreed, that children may be efficaciously baptized

before they are born, if the water can be made to touch any part of their bodies, or the membranes in which they are involved; and surgeons are cautioned to see this ceremony performed, whenever, from the difficulty of the labour, the life of the child shall appear to be in danger. On the other hand, they are admonished, that to open the head of a child before it is certainly known to be dead, with a view of preserving the life of the mother, is to commit murder, and consequently not to be allowed. An abridged edition of this work was published by the abbe Dinouart, in 1761, and 1766, 12mo. Haller Bib. Anat. Eloy. Dist. Hist.

CANGIANO, in *Geography*, a town of Naples in the province of Principato Citra; 27 miles N. of Policastro.

CANGOXIMA, **CANGOXUMA**, or **COGOXIMA**, is a sea port on the most southern verge of the isle of Japan. It was the first at which the Portuguese landed, and they afterwards chose to make it the centre of their commerce, on account of its advantageous situation and commodious harbour. The entrance into it is, indeed, dangerous by reason of a number of rocks, that lie at some distance from it; on one of which is seated a strong castle, said to have been built by Ongoschio, the grandfather of the emperor Gongon, or Gonjin, with a view of securing the city, which is the key of the kingdom of Saxuma, and of the whole island. At the entrance of the haven was constructed a square light-house, situate on a very high rock, which is visible at sea at the distance of above 20 miles; and at the foot of the rock is a convenient road for shipping. The quay is guarded by a stone dyke, which runs into the sea, and has a stone rampart breast-high, covered with copper. In each of 2 large wings built at one end of it are stationed 500 men, who keep watch night and day, to check the kings of Saxuma, who often revolted in order to avoid paying tribute to the emperors. The town is watered by a river which descends from the mountains into a canal formed for receiving it, and from thence it falls with great rapidity into the sea. On the south side of the river is a custom-house for receiving duty, besides other large and sumptuous magazines belonging to the emperor.

CANHAR, a river of Hindoostan, which runs into the Soane, 5 miles S.W. of Bidjigur.

CANI, two small flat islands of Africa, in the Mediterranean, near the coast of Tunis, situate about 4 leagues to the north-north-west of the cape Pil-loe, and very nearly in the middle way to cape Blanco. These islands seem to occupy the situation assigned by Ptolemy to his Insula Dracontia. N. lat. 37° 45'. E. long. 10° 30'.

CANI, *Grotto del*. See *Grotto del Cani*.

CANJA, in *Nautical Language*, a vessel employed on the Nile, and represented by Mr. Bruce as commodious, safe, and expeditious in sailing. That which he describes (*Travels to Africa*, Vol. I. p. 43.) was about 100 feet from stem to stern, with two masts, main and foremast, and two monstrous latine sails, the main-sail-yard being about 200 feet in length; about 30 feet in the beam, and about 90 feet in keel. The keel is not straight, but a portion of a parabola whose curve is almost insensible to the eye, but having this advantageous effect in sailing, that as the bed of the Nile, when the water becomes low, is full of sand-banks under water, the keel under the stem, where the curve is greatest, first strikes upon these banks and is fast, but the rest of the vessel is afloat; so that by the help of oars and aid of the stream, furling the sails, you easily get off; whereas, if the keel were straight, and the vessel advanced with the pressure of its immense main-sail, it must remain immovable upon the bank, and be wrecked. When this vessel is proceeding up the stream, before the wind, the yard and sail are

never lowered. The sailors climb and furl it as it stands. When they shift the sail, they do it with a thick stick like a quarter-staff, which they call a "noboot," put between the lashing of the yard and the sail; they then twist this stick round till the sail and yard turn over to the side required. When the vessel returns, they take out the mast, lay down the yards, and put by their sails, so that the boat descends like a wreck broadside forwards; otherwise being so heavy a-loft, were she to touch with her stem going down the stream, she would not fail to carry away her masts, and perhaps be flayed to pieces. The cabin of this vessel has a very decent and agreeable dining-room, about 20 feet square, with windows that have close and latticed shutters, so that they may be opened at pleasure in the day-time, and admit the fresh air; but they should be carefully kept shut at night. See *Plate of Ship*.

CANIADERAGO, in *Geography*, a lake of North America, in the county of Otsego or Oswego, and state of New York. It is as large as the Oswego lake, and 6 miles west of it. From this lake issues a stream, called Oaks creek, which falls into Susquehannah river, about 5 miles below Oswego. The best cheese in the state is made on this creek. N. lat. $42^{\circ} 43'$. W. long. 75° .

CANICODEO, creek, a south-west head-water of Tioga river in New York, which interlocks with the head-waters of Genesee river, and joins Conesteeo creek, 26 miles W.N.W. from the Painted Post.

CANICULA, in *Ichthyology*, a sort of *SQUALUS*, or Shark, that swarms in all the European seas, and preys on fish. The English fishermen are well acquainted with this voracious creature by the name of the Spotted Dog-fish, the head, back, sides, and fins being marked with large distinct black spots on a brownish ground, with only the belly and lower part of the sides white. This fish seldom exceeds the length of four, or at most, five feet. The skin, when dried, is useful for various purposes. The species is known by having the nostrils surrounded by a lobe and vermiform appendage, and the ventral fins distinct; a character that must be attentively considered, in order to determine the *Squalus Canicula* from its very analogous species *Squalus Catulus*, the latter differing principally in being of a smaller size, and having the ventral fins united. Vide Donov. Brit. Fishes.

Obf. This is the Linnæan *Squalus Canicula*, *Squalus conducta* of Osbeck; *Catulus* major of Jonston, and *Roufsette* of most French writers.

CANICULA, in *Astronomy*, is a name given to one of the stars of the constellation *CANIS major*; called also simply the *Dog-star*; by the Greeks, *Συρος*, *Sirius*.

Pliny and Galen also give the appellation *Procyon* to the *Canicula*; though, in propriety, *PROCYON* is the name of another star, in the Lesser Dog.

Canicula is the tenth in order in the Britannic Catalogue; in Tycho's and Ptolemy's it is the second. It is situate in the mouth of the constellation, and is of the first magnitude; being the largest, and brightest, of all the stars in the heavens.

From the heliacal rising of this star, that is, its emergence from the sun's rays, which now happens about the 11th day of August, the ancients reckoned their *dies caniculares*, or dog-days.

The Egyptians and Ethiopians began their year at the rising of *Canicula*; reckoning to its rise again the next year, which is called the *Annus Canarius*.

CANICULAR days, properly denote a certain number of days, preceding and ensuing the heliacal rising of *Canicula*, or the *Dog-star*, in the morning; to which the ancients ascribed an extraordinary influence.

This opinion, equally erroneous and superstitious, seems to have originated with the Egyptians, who, observing this rising of the *Dog-star*, which anciently took place in Egypt about the time of the sun's arrival at the summer tropic, when the Nile began to rise, upon the overflow of which the fertility of their country depended, were induced to pay divine honours to this star. They imagined that it not only indicated the time of the Nile beginning to rise, but that it was the efficient cause of its overflowing, or of the fertility connected with this circumstance. From the colour of the star at its first appearance, they formed prognostics what kind of seasons they were to expect; so that if it were of a golden colour, they thought it presaged a fruitful year; but if it appeared pale and dim, they regarded it as a bad omen, that portended a scarcity. They fancied also, that the *Dog-star* rising with the sun and joining his influence to the fire of that luminary, was the cause of the extraordinary heat which usually falls out in that season; and accordingly they gave the name of the *dog-days* to about six or eight weeks of the hottest part of summer. The Greeks, in imitation of the Egyptians, their masters in idolatry and superstition, as well as science, held the same opinion, that the *dog-star* was the cause of that sultry heat so often pernicious to the health and life of man. Homer, (*Iliad*. l. xxii. v. 30.) comparing the shining of the armour of Achilles, whose fury was so fatal to the Trojans, to the pernicious blaze of the *Dog-star* rising at the end of summer, calls it an ill omen, "portending heat intense to wretched mortals;" or as the sense of the passage is well expressed by Pope:—

—————"his burning breath

"Taints the red air with fevers, plagues, and death."

When the father of the poets had expressed himself in this manner, it is no wonder that others should speak of the rage of the *dog-star*, as some of them do of the fury of the lion, (*Hor.* l. iii. *Od.* 9. *Virg. Æn.* l. x. v. 270.) because a star of the first magnitude, called the *Lion's heart*, rising in the time of the *dog-days*, was also thought to contribute towards the great heat of that season.

Some authors tell us, from Hippocrates and Pliny, that on the day the *Canicula* first rises in the morning, the sea boils, wine turns sour, dogs begin to grow mad, the bile increases and irritates, and all animals grow languid; and that the diseases ordinarily occasioned in men by it are burning fevers, dysenteries, and phrenies. Although Hippocrates had a sentence or aphorism that seems to forbid the use of purging medicines in the *dog-days*, we must not conclude from hence that great physician and philosopher to have thought the influence of the *Dog-star* considerable. It is probable, that he only meant to point out the hot time of the year, commonly marked by the rising of the *Dog-star*. The Romans sacrificed a brown dog every year to *Canicula* at its rising, to appease its rage. They supposed *Canicula* to be the occasion of the sultry weather, usually felt in the *dog-days*.

As to the *dog-days* attended to by some with so much superstitious regard, it is pleasant to observe what variety of opinions have prevailed both among the ancients and moderns about the beginning and the end of them. This variety is, in some instances, owing to the ignorance of the writers, who did not know or consider that the *Dog-star* varies in the time of its rising in any one year as the latitude varies, and that it is always later and later every year in all latitudes; so that in time, this star, by the same rule, may chance to be charged with bringing frost and snow, when he rises in winter. In an ancient calendar preserved by Bede, the begin-

ning of the dog-days was placed on the 14th of July. In one prefixed to the common prayer, printed in the time of queen Elizabeth, they are said to begin on the 6th of July, and to end on the 5th of September; and this was continued from that time till the restoration, when that book was revised, and the dog-days omitted. From that time to the correction of the British calendar, our almanacs had the beginning of the dog-days on the 10th of July, and the end on the 28th of August: but since that correction, the times of the beginning and end have been altered; and the former was placed at the 30th of July, and the latter at the 7th of September. The dog-days have been commonly reckoned for about 40 days, viz. 20 days before, and 20 days after the heliacal rising; and almanac-makers have usually set down the dog-days in their almanacs to the changing time of the star's rising; and thus they had at length fallen considerably after the hottest season of the year; till of late, a very proper alteration has been introduced into the almanacs, and they have been made to commence with the 3d of July, and to terminate with the 11th of August. The propriety of this alteration will be evident, if we consider, that the ancients meant to express by the dog-days, the hottest time of the year, which is commonly during the month of July, about which month, the Dog-star rose heliacally in the time of the most ancient astronomers, whose observations have been transmitted to us: but the precession of the equinoxes has transferred this heliacal rising to a much later and cooler part of the year; and because Hesiod tells us that the hot time of the year ends on the 50th day after the summer solstice, which brings us to about August 10, or 11, the above-mentioned alteration seems to be not only necessary, but very proper.

CANICULAR year, denotes the Egyptian natural year, which was computed from one heliacal rising of Canicula to the next. This is also called annus canarius, and annus cynicus; by the Egyptians themselves the Sothic year, from Soth, a denomination given by them to Sirius. Some also call it the heliacal year.

The canicular year consisted ordinarily of 365 days, and every fourth year of 366 days, by which it was accommodated to the civil year. The reason of their choice of Canicula before the other stars, to compute their time by, was not only the superior brightness of that star, but because its heliacal rising was in Egypt a time of singular note, as falling on the greatest augmentation of the Nile, the reputed father of Egypt. Ephesius adds, that from the aspect of Canicula, its habit and colour, the Egyptians drew prognostics concerning the rise of the Nile; and, according to Florus, predicted the future state of the year. So that the first rising of this star was yearly observed with great attention. Bainbrigge, *Canicul. cap. 4. p. 26.*

As the Egyptian year of 365 days was about six hours shorter than the true solar year, the heliacal rising of Sirius gradually advanced, at the rate of nearly one day in the interval of four years; so that in 1461 years, it completed a revolution, by rising on every succeeding day of the year, and returning to the point originally fixed for the beginning of the first month, called *Thoth*, or *Soth*. This period, equal to 1460 Julian years, was termed the great Egyptian year, or "Canicular cycle." Censorinus (*De Dei Nat. c. 18.*) informs us, that in the consulate of Antoninus Pius, and Brutius Præfens, A.D. 138, the canicular year was renewed. If we reckon backwards 1460 Julian years, we come to the year B. C. 1322, when the sun was in 14° of Cancer, that is, 14 or 15 days after the summer solstice, which happened on July the 5th. Again, in the beginning of the Nabonassarean æra, i. e. B. C. 747, the Thoth, or

first day of the Egyptian year, had receded to the 26th of February, from July the 20th, when Sirius had been observed to rise heliacally in Egypt. This interval of 144 days, multiplied by four, gives 576 years. The canicular year must, consequently, have begun 576 years earlier than the æra of Nabonassar, viz. in the year B. C. 1322, or 1323, which nearly corresponds with the former date. In this matter, great accuracy cannot be expected, as the observation of the heliacal rising or setting of a star depends upon the state of the atmosphere, the difference of latitude, the situation of the observer, and other circumstances. Bailly (*Hist. de l'Astron. l. vi. c. 8.*) fixes the date of the establishment of this period in the year B. C. 2782, on the authority of a passage said to have been extracted out of Manetho's history, which intimates, that the shepherds invaded Egypt in the 700th year of the Sothic cycle; and in a vague tradition, that it commenced when Sirius rose heliacally at the summer solstice. But the grounds of this opinion are such as to entitle it to no great regard.

CANICULATUS, in *Conchology*, a species of *MYTILUS* that inhabits New Zealand. The shell is smoothish, and brown without, the interior surface tinged with various colours, and the socket of the hinge grooved. Martyn. &c.

CANICULUM, or **CANICULUS**, in the *Byzantine Antiquities*, a golden standish, or ink-vessel, decorated with precious stones, wherein was kept the sacred *encaustum*, or red ink, wherewith the emperors signed their decrees, letters, &c. The word is by some derived from *canis* or *caniculus*; alluding to the figure of a dog, which it represented; or rather because it was supported by the figures of dogs. By Salmassius it is derived from *κακιν*, an inkhorn. The caniculum was under the care of a particular officer of state, hence called *caniclinus* or *canicleus*, who was in great request. Du-Cange will have the *caniclinus* to have been the same with the **LOGOTHETA**.

CANIGO, in *Geography*, an eminence of the Pyrenées, about 1440 French toises.

CANINA, a town of European Turkey, in Albania; situate in a district of the same name on the sea-coast, near the gulf of Venice. N. lat. 40° 28'. E. long. 19° 50'.

CANINA, in *Zoology*, a species of *ASCIDIA* that inhabits the Atlantic and northern seas. It is of an elongated shape, round and flaccid, with a red pouch. Müll. Zool. Dan. Obs. This is the *fac-animal* of Dicquemar, and *Mentula marina* of Redi. Bohadseh calls it *Tethyum fasciculatum*.

CANINA, a species of *BOA*, described by Linnæus as having 203 abdominal plates, and 77 caudal scales. This beautiful snake is an inhabitant of South America; where it frequently rolls itself round trees, from whence it can the more readily perceive and dart upon its prey. The usual length of this snake is about four feet, and its thickness moderate in proportion. Its head is large, and bears such a striking resemblance to that of a dog that Linnæus gave it the specific name of *canina*, in allusion to that circumstance. The colour of the whole animal on the upper parts is of a fine faxon-green, with several short, undulating, transverse white bars down the back, the edges of which are of a deeper green than the ground-colour of the body: the abdomen is white.

Boddaert speaks of a specimen of this boa in which the abdominal plates amounted to 208 instead of 203, at the same time that the sub-caudal scales were exactly the same in number as Linnæus describes them. That examined by Gronovius differed in both particulars from the Linnæan specimen, having 205 abdominal plates and 79 sub-caudal scales.

Laurenti describes this species under the title of *boa thalassina*:

laffina: Seba by those of *Serpens Bojobi brasiliensis*, *Tetraochoatl Tleola*, and *Lusitanis Cobre verde*.

There is another kind of snake very closely allied to the above species, that inhabits the East Indies, and is supposed by Gmelin to be a variety only of the same snake. Laurenti calls it *Boa aurantiaca*, and Seba *Serpens Bojobi ceylonica*: the ground colour is of a fine orange: the dorsal bands pale yellow, edged with red, and the abdomen pale yellow.

CANINANA, the name of a species of serpent found in America, and esteemed one of the less poisonous kinds. It grows to about two feet long, and is green on the back, and yellow on the belly. It feeds on eggs and small birds; the natives cut off its head and tail, and eat the body as a delicate dish. Ray.

CANINE, in a general sense something that relates to dogs.

CANINE appetite, *appetentia et fames canina*. See *BULIMIA*.

CANINE laughter, *risus caninus*, that wherein the lips are drawn far back, and the mouth much extended.

CANINE ligament, is that whereby the prepuce of the human penis is fastened to the glans, otherwise called the *frænum*.

CANINE madness, *rabies canina*. See *HYDROPHOBIA*.

CANINE sulphur, a sort of native sulphur, discovered near Reggio, intermixed with earthy or stony matters; thus called by reason that dogs are so fond of it, as to dig it out of the earth.

CANINE teeth; *canini dentes*. See *TEETH*.

CANINÉ, in *Geography*, a town of Africa, in the kingdom of Angola; seated on the river Lucala, S. lat. 8° 56'. E. long. 17° 28'.

CANINI, ANGELO, in *Biography*, a learned grammarian of the sixteenth century, was born in a small city in Tuscany, called Anglara, or Anghiari; and employed himself for several years in teaching the Oriental languages in Venice, Padua, Bologna, Rome, Spain, and France. At Paris he had for his scholar, Andrew Dudith, an Hungarian, afterwards celebrated for his learning and embassies. At length he entered into the service of William du Prat, bishop of Clermont; and he died in Auvergne in 1557. His "*Institutiones Linguae Assyriacæ atque Thalmudicæ, una cum Æthiopica atque Arabicæ Collatione, &c.*" Paris, 1554, 4to. are much esteemed. His "*Greek Grammar*," or "*Hellenismi*." Paris, 1555, 4to. has been highly commended; and by Tanaquil Faber of Saumur, who prefers Caninius before all other grammarians, it is denominated "*The Treasure of Hellenism*." "*A Latin Translation of Simplicius's Commentary upon Epictetus's Manual*," printed at Venice in 1546, fol. is attributed to this author. Gen. Dict.

CANINI, in *Ancient Geography*, a country of Rhætia, supposed to be that of the Grisons.

CANINUS *musculus*, in *Anatomy*, the same as *elevator labii superioris*, which see.

CANIOPOLIS, in *Ancient Geography*, the name of an ancient episcopal town of Thrace, mentioned in the acts of the council of Sardica, held in 347.

CANIPSA, or CAPSINA, a town of Arabia Felix, seated on the Persian gulf; W. of the mouth of the river Lar. Ptolemy.

CANIS, in *Zoology*, a species of *ASCARIS*, that infests the intestines of the common dog. This kind is distinguished by having the tail pointed, the head flat, and furnished on each side with a wing-like membrane, and the spermatic vessels curled. Wern. Verm. Intest. &c.

CANIS, a genus of the *MAMMALIA FERÆ*, distinguished by the following character: fore teeth, upper six; lateral ones

longer, distant; intermediate ones lobate; lower six, lateral ones lobate: tusks solitary and incurvated; grinders six, seven, or more than in others.

This genus comprehends the common dog, *familiaris*, and its varieties, with the species *Lupus*, *Mexicanus*, *Thous*, *Hyæna*, *Crocota*, *aureus*, *Mefomelas*, *Lycaon*, *Vulpes*, *Alopex*, *Corfae*, *Karagan*, *cinereo-argenteus*, *virginianus*, *Lagopus*, and *Cerdo*, which see respectively.

CANIS Major, the Great Dog, in *Astronomy*, a constellation of the southern hemisphere, below Orion's feet, though somewhat to the westward of him; whose stars Ptolemy makes 29; Tycho only observed 13; Hevelius 51; in the *Britannic Catalogue* they are 31.

It is unnecessary to advert to the fables of the Greeks concerning the elevation of the dog to the heavens, as the origin of this constellation, as well as of its other name *Sirius*, is more probably to be found in the superstition of the Egyptians; who, as we have already observed, (See *CANICULAR days*), carefully watched the rising of this star, and judging by it of the swelling of the Nile, called the star the sentinel and watch of the year. Hence, according to their mode of hieroglyphic writing, they represented it under the figure of a dog; they also called this star *Isis*, the name given to their great goddess, and *Thoth*, the name of their god Mercury, whom for his sagacity in the invention of letters, arts, and sciences they sometimes painted in the form of a dog, or of a man with a dog's head, and worshipped him under the name of "*Anubis*," which see. They called the same star "*Sothis*," or *Siothi*," which, in the Egyptian language, according to Kircher, signifies holy. Sidor and Siris are also other names for the Nile, from whence Vossius derives *Sirius*, the Greek name of this star, which was imagined to have such dominion over that river; and also *Osiris*, the name of one of their principal deities.

CANIS Minor, the Little Dog, a constellation of the northern hemisphere; called also by the Greeks, *Procyon*, and by the Latins *Antecanis* and *Canicula*. This, as well as the former, is one of the old 48 constellations. According to the fables of the Greeks, it is one of Orion's hounds: but the Egyptians were probably the inventors of this constellation, as well as *Canis Major*; and they might have given it this figure to express a little dog, or watchful creature, preceding and conducting, as it were, the larger, or rising before it; hence the Latins have denominated it *Antecanis*, which see. The stars in the constellation *Canis Minor* are in Ptolemy's *Catalogue* 2; in Tycho's 5; in Hevelius's 13. In the *British Catalogue* they are 14, of which the principal is *Procyon*.

CANIS flumen, or CYNOS flumen, the river of the dog, in *Ancient Geography*, a river of Arabia Felix, which discharged itself into the Persian gulf: probably the same with the *Lar* of Ptolemy.

CANIS Carcharius, in *Ichthyology*. See *SQUALUS CARCHARIS*.

CANIS Galeus. See *SQUALUS GALEUS*.

CANIS Volans, in *Zoology*, a name indiscriminately given by old writers to the vampire and ternate bat, *Vespertilio Spectrum* and *Vampyrus*. *Canis volans* was also called *Vespertilio cauda nulla*, both the above being of the tailless kind of bats. *Canis volans ternatanus orientalis* of Seba is the Great Bat; *Canis volans maxima aurita ex Nova Hispana* of the same writer is the Vampire of Buffon.

CANISBAY, in *Geography*, a small fishing town of Scotland, in the county of Caithness, and most northern part of Scotland; 11 miles N. of Wick.

CANISCHA, a town of Hungary, taken by the Turks in 1600 and retained by them till the year 1690, when it

was captured by the imperial troops after a blockade of 2 years, and ceded to the emperor by the peace of Carlowitz; 96 miles S. of Vienna.

CANISIUS, HENRY, in *Biography*, a native of Nimeguen, who became professor of canon law at Ingolstadt, and who was no less distinguished for his piety and modesty than for his erudition. He died in 1610. Among his works in law and antiquities, which are highly esteemed, we may mention his "Summa Juris Canonici;" "Commentarium in Regulas Juris;" "Prælectiones academicæ de Decimis primitiis, &c." and his "Antiquæ Lektionen," 6 vols. 4to. containing a collection of curious pieces relating to the history and chronology of the middle ages, printed by J. Bafnage, in 7 tomes, 4 vols. fol. Amsterd. 1725; with learned prefaces and remarks by the editor; and notes, with various readings, by Capperonier. Nouv. Dict. Histor.

CANISOLA, in *Geography*, a town of the island of Cherfo, in the Adriatic; 22 miles N. of Cherfo.

CANISTER, *Great*, a small island in the bay of Bengal, near the coast of Siam. N. lat. 12° 58'. E. long. 97° 40'.—*Little Canister*, another small island in the same bay and near the same coast; 2 leagues S. from the former.—*West Canister*, a small island in the same bay, near the same coast. N. lat. 12° 37'. E. long. 97° 16'.

CANISY, a town of France, in the department of the Channel, and chief place of a canton, in the district of St. Lo, 4 miles S.W. of St. Lo. The place contains 838, and the canton 9060 inhabitants; the territory includes 90 kilometres and 12 communes.

CANITZ, *baron of*, in *Biography*, a German poet and statesman, was of an ancient and illustrious family in Brandenburg, and born at Berlin in 1654. After having completed his early studies, he travelled to France, Italy, Holland, and England; and upon his return, he was charged with important negotiations by Frederic II. He was also employed by Frederic III. Although he was more extensively known as a politician than a poet, his poems have been much admired by his countrymen, and they were published for the tenth time in 1750, 8vo. Most of them were of the moral elegiac kind, expressive either of the tenderest sentiments of conjugal affection, or of such reflections as naturally occurred to a contemplative and virtuous mind on the various events of life. Horace is said to have been his model, and his compositions are written in a pure and delicate style. He was eminently learned and ingenious, virtuous and benevolent. Having attained the office of privy counsellor of state, he employed the influence acquired by his distinguished character and high station in giving encouragement to literature and the fine arts. The disease which terminated his life was tedious and lingering, and he observed the slow but certain approaches of his last enemy with the calmness and fortitude that became the christian philosopher. When his physicians had pronounced his case to be hopeless, he ordered a skull to be brought to him, and dictated some poetical meditations on this object in connection with his own circumstances, which are justly deemed the most beautiful of his productions. He retained his cheerfulness to the last; and just before his death, desired to be led to the window, which he opened: when, having gazed some minutes at the rising sun, he exclaimed, "O! if the view of a part of the creation can be thus beautiful and reviving, how infinitely delightful must be that of the Creator!" He spoke, and died, in 1699, at the age of 45. Bildnisse, &c. or Portraits of celebrated German literati, &c. Berne, 1793.

CANKER, in *Gardening*, a vegetable disease common in fruit and other trees, produced by a sort of ulceration in the bark arising from bruises, the old or dead wood remain-

ing on the trees, and various other causes. It is observed by the author of the Philosophy of Gardening, that this disease may be termed *gangrena vegetabilis*, and that it is a phagedenic ulcer of the bark, which is very destructive to apple-trees and pear-trees, as it spreads round the trunk or branches, and destroys them. Mr. Knight has observed "it to be most frequent and fatal to those trees the fruit of which has been long in fashion, having been perpetually propagated for a century or two by ingrafting; which he believes to be a continuation of the old tree, though nourished by a new stock; and that the canker is thus a disease of old age like the mortification in the limbs of elderly people, and arises from the irritability of a part of the system."

But it seems more probable in the opinion of the first writer, that "it is an hereditary disease, as the buds of trees being a lateral progeny, and more exactly resembling their parents, must be more liable to the diseases gradually acquired, or increased, by the influence of soil or climate, and have not the probability of improvement which attends the progeny of sexual generation. It is nevertheless frequently produced on trees by external violence, as a stroke with a spade given by a careless labourer who is digging near them; but this probably may more easily affect the old grafts above-mentioned. When a destruction of the bark is thus produced by external violence, it may possibly, he supposes, be cured by the application of a piece of living bark from a less valuable tree bound upon it."

It is likewise recommended, that "the edges of these gangrenous ulcers of the bark should be nicely pared off with a knife, so as to admit the air and to prevent the depredations of insects, and the lodgment of moisture, which might promote the putrefaction of the stagnant juices, and spread the gangrene. This should be so managed as only to cut away the dead lips of the wound, but not so as to injure the living bark. Some thick white paint may then be smeared on the naked alburnum, or sap wood, on a dry day, which may prevent insects from inserting their eggs into it, and producing maggots, which erode and destroy the wood, and may also prevent the dews and rain from rotting it. The paint should, nevertheless, be so spread as not to touch the edges of the wound, as it might injure their growth by its poisonous quality. A quarter of an ounce of sublimate of mercury, "*hydrargyrus murialis*" rubbed with about a pound of white lead-paint renders it more noxious to insects."

Mr. Forsyth thinks it a mistake that it always depends upon the nature of the ground, as four clays or shingly gravels. He contends that it invariably proceeds from the branches to the roots of the trees, and never in the contrary direction.

In the cure of this disease, when extensive, he advises the careful paring off with a draw-knife or other convenient instrument of "all the diseased parts of the bark." And that as the inner white bark is frequently infected, this must also be cut away, till no appearance of infection remains. The infection in the inner bark appears like dots made with a pen, all of which must be cut clean out; for if any part of the canker be left, it will infect the new wood and bark. Wherever you see gum oozing out, you may rest assured that the canker is not quite eradicated; which, if suffered to remain, will spread till the whole tree becomes a mass of gum and canker, and will be killed in a very short time. When the trunk is become hollow, cut the loose rotten part clean out, till you come to the sound wood, taking care to round the edges of the hollow part; then apply the composition in a liquid state, laying it on with a painter's brush wherever the cankered bark has been pared off or

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the dead wood cut out, till these places are entirely covered with it; when that is done, shake some of the powder of wood ashes and burnt bones over the composition, and pat it gently down with your hand." See COMPOSITION.

He contends, "that if the foregoing directions be carefully followed, the canker will be completely eradicated, and the hollow trunk in time be filled up with sound wood. When the stem is much decayed, he thinks it will be absolutely necessary to open the ground, examine the roots, and cut off all the rotten parts. When you have cut out all the rotten and decayed parts below ground, and scraped the hollow clean, make up a mass of the composition, mixed with some clay, like what is used for grafting; then fill the hollow part with it to within two inches of the surface of the ground, treading it in with your foot, or pressing it in with the hand as close as you possibly can, to prevent the wet from penetrating to the roots, and leave the surface of the composition sloping from the tree towards the outside of the border to throw the wet off, which will prevent the fresh part of the root from rotting; then cover the root over with mould level with the rest of the border;" and, "when you have examined all the old wounds, where large limbs have been cut off, you should next examine the old bark; and if you should find the outside of it wrinkled and cracked, pare it off, as it is always, when in that state, very much hurt by the canker. This should be done with the draw-knife, or other sharp instrument; then apply the composition as before directed, which will bring on a fine smooth bark under it. In the succeeding winter or spring, you will see all the plaster with the old part of the bark that was left in the hollow parts of the tree, or where old branches had been amputated, peeling off and shewing the smooth bark underneath. You should then scrape off, with a wooden or bone knife, what old bark remains in the hollows where the draw-knife could not reach, without cutting too much away. When that is done, mix up some fresh cow-dung with soap-suds and urine, making it very thin, and give the tree a coat of this mixture all over where the bark has been scraped off; the cow-dung will adhere to it, and heat the parts where you were obliged to scrape to the inner bark. This wash will, he says, remain till the fresh bark comes on; then it will be discharged of itself, during the summer, or the next spring, leaving a new fresh bark where the old and cankerous was taken off. Next spring, if any of the old bark remains, you may repeat the same operation, which will cause all the remaining old bark to slough off like a scab from a wound of a human body. By these means, he contends, that you will keep your trees in a fine flourishing healthy state, and, in general, prevent them from becoming bark-bound. If any of them, notwithstanding, should be bark-bound, you must scarify them, by taking a sharp knife, and running the point of it straight down the middle of the stem from top to bottom, taking care to run your knife through the outer bark only; then, with a brush, or your finger, rub in some of the composition, to prevent the incision from bringing on the canker."

This operation will cause the tree to expand the bark and become very flourishing.

And it is advised to remember to cut off all the ends of the small shoots where the canker had injured them last year.

Cut off also the old fruit stalks, and all the small dead stubs, which, if left, will never fail to bring on the canker.

The rough, or cankerous bark, or that side of trees which is next the wall, should be scraped or pared off with a tool made in the form of a sickle. "It is much," he says, "to be

regretted, that fruit-trees in general, throughout this kingdom, are in a mutilated, unfruitful state. After gentlemen have purchased the young trees from nurseries, and planted them in their orchards and gardens, they think, says he, that every thing necessary is done; when, in fact, the greater part of the work is yet to come. In packing a carriage, the stems and branches are very frequently bruised; in that case, the injured parts of the bark and wood must be carefully cut out, and the composition immediately applied: this may be done when you head the trees, which operation should be performed in April, May, or even June, when the buds begin to shoot; but by no means cut off any of the shoots, except those that are broken or bruised very much. When this is neglected, the canker will follow to the great injury, if not death, of the trees.

"How common, continues he, is it to see, in all parts of the country, great numbers of trees so affected with this disease, as not to produce fruit enough in twelve or fourteen years to pay half the expence attending them; whereas, if they were to be managed according to the foregoing directions, they would more than pay all the expence in three years. It is common, when young trees do not thrive, either to blame the nursery-men for sending bad or diseased trees, or to attribute their unthriving state to the nature of the soil; whereas the fact is, that this frequently arises from the inattention or mismanagement of the person who plants and superintends them.

"If the injured and diseased parts be not cut out at an early period, the trees will not thrive, but will become cankerous and stunted, and cannot be recovered afterwards without a great deal of labour and trouble; whereas, if the directions given for heading trees the first year, and cutting out the diseased parts, be attended to, the trees will flourish and bear large crops of fine and well-flavoured fruit."

CANKER, in *Surgery*, is a popular name for those small eroding ulcers which take place spontaneously in the cheeks, lips, and gums. This troublesome species of sore is probably connected for the most part with a state of debility in the patient; as it is cured by tonic remedies given internally, accompanied with aesculent diet and country air. It is also sometimes useful to touch the ulcer with diluted acids, or a strong solution of alum in water.

CANKER, in *Veterinary Science*, a dreadful disease incident to the feet of horses, and not of unfrequent occurrence, being very troublesome to cure, and of unsightly appearance, exciting the same sensations in the mind of horror and dislike, as do the loathsome animals whose names have been applied to it; hence the term *cancer* or *canker*, the *crab*, and the French term *crapaud* or *toad*, and in more ancient times *lupus* or the *wolf*.

We venture, however, to assert, that there is nothing specifically poisonous generated in the sores of this description, as in the human cancer, though it has been so imagined by many; from having ourselves been frequently inoculated with the secretions from these sores, (as have, no doubt, thousands of others,) without, perhaps, an instance of any contagion arising from it; nor in the cure is there any specific necessary, as in the cancerous, rabid, or venereal poisonous ulcers.

It may be defined, perhaps, as a simple ulceration of the *corniferous*, or horn-bearing parts of the foot, attended with more or less weakness of the parts in forming horn, and generally of irritation from the horny edges surrounding the sore; nor in the indications of cure is there any specific necessary, as we have before observed; but the greatest diligence and attention are requisite in destroying those causes of irritation, and in procuring and encouraging the natural

natural growth of the horn over the exposed parts, which, in old cases, is found difficult enough.

In describing the situation and appearance of this disorder, we may observe, that all parts of the foot that are covered with horn may become the seat of this complaint, and its appearance will vary indefinitely, depending upon the greater or less degrees of weakness of the fore, or irritation from the surrounding horn. The most usual appearance, however, is a light, puffy, fungus, easily bleeding when touched, and rising higher than the edges of the surrounding horn, giving out a thin watery discharge, with a disposition in the ulcer to spread and run under the contiguous horn, and if not timely checked, it will extend itself over the whole foot, when the hoof falling off the horse is necessarily lost. On the other hand, where the proper means of correcting this ulceration are used, the contiguous horn is removed, the fungus is reduced, the parts become dry, horn again extends itself over the diseased surface, and the foot becomes as perfect as it was before.

The time often required to correct the morbid disposition in the part itself, and afterwards in procuring the natural growth of the horn, is so truly tedious, as, in very bad cases, to make the expences of keep and cure more than overbalance the value of the horse, and it would be to the disadvantage of his proprietor to attempt it; in other cases it is so easily subdued as to be well worth the time and expence of curing.

The narrative of a case or two will be a more impressive way of describing the treatment of this complaint than any exposition in general terms; and for this purpose we shall select a successful and an unsuccessful case, such as they occurred to us; and here let me remark, in doing that justice, we wish to hold an example of to every one in these matters, that among the shoeing smiths there are many who take great pride in the cure of this disorder, and whose practice, pretty much confined to this object, has rendered very expert; and as much depends on the adroit use of the drawing-knife in removing the horn from the ulcerated parts, they would have vastly the advantage over a young practitioner in this respect, though in other respects their treatment should be the same, though these have sometimes failed in bad cases, or the long protracted cure has rendered it of no real advantage to the proprietors. The disease, we may observe, is almost always artificially induced, and may be prevented, which is of vastly more advantage to know than the mode of its cure.

The foot of the horse may be considered as partaking somewhat of the nature of a gland, which is giving out and secreting horn, and whose ulceration will be attended with other phenomena than occur in the ulceration of fleshy, or other parts of the animal structure, and this peculiarity will render a different treatment necessary.

The following is a statement of the treatment of a successful case of this disorder, with some observations as the case proceeds.

A black draft horse that had been under the care of a shoeing-smith about nine or ten months to be cured, without success, was put under our care in a truly deplorable condition. The sole and frog were almost one extended surface of disease, secreting a white curdy fluid, which was poured out in great abundance about the sides of the frog: this fluid was probably formed of the union of lymph, and the vessels throwing out imperfect horn which became partially dissolved in it; the same appears to be secreted in running thrush, and if allowed to remain long on the part, becomes highly fetid.

The edges of the horn encircling the fore were found to

be detached, undermined, and black within; these were every where removed by thinning away the horn with a sharp drawing knife, and when pared so thin and soft that the drawing knife would no longer lay hold of it, a lancet blade made rather stronger than those usually are for bleeding, and stuck in a handle, was used for thinning away the remaining part, and to dissect small bits of horn in situations where the drawing knife would not conveniently reach. This tedious process was pursued on every side of the fore which was found to extend to the wall of the foot, and took up a considerable time, the effusion of the least blood being cautiously avoided, as this would flow over and obscure the parts to be cut. The foot was then smeared over with egyptiac, or the cupreous acetite, and honey, boiled together, though we found it equally, or superiorly efficacious for this purpose when made of blue vitriol and treacle, at a much less expence, which may be acceptable information to those who may have to use a large quantity of it: over this dressing, pledgets of tow dipped in tar and plentifully soaked with it are laid, till they cover it to a considerable depth. A hollow shoe having been previously tacked on by a few nails, an iron plate is passed under it, and this is fastened in by iron splents between it and the shoe, and driven moderately tight with a hammer: similar dressings are applied to the heels and sides of the foot if requisite, and then bound on tight by tar cords. These dressings require to be removed every 48 hours, or when the disease is very virulent, every day: if on removing the dressings they appear tolerably free from moisture, it is a favourable sign. If the foot reeks, and the dressings appear drenched with perspiration, little or no permanent horn will be found to have formed; if, on the contrary, the parts are doing well, the ulcer will appear almost dry, with a brown scale of horn formed upon its surface, which will generally shell off of itself, if not removed, and is best removed, and this for several successive times, till the parts acquire the requisite strength for supporting the horn that is formed, which should however be kept as thin as possible for a considerable time, that it may not irritate and exfoliate again. The surface that was undermined, and from whence the horn had been recently removed, will be found the next day to have swelled very much into a sort of more healthy fungus, and on the surface of which, horn will begin to form; this being removed, another layer beneath this takes place, and so on till it reaches the natural foot. By this curious process nature seems to acquire room, and avoids that compression which the immediate formation of horn on the ulcer would occasion. The parts of the fore that were subject to irritation may be known by the thin discharge, and the rising soft bleeding fungus; and the points of horn irritating them must be carefully removed to a considerable distance.

The first horn that forms, especially of the sole and frog, readily peels off, and exhibits underneath small white fibres, by which it adhered; the second coat is more firmly attached; and in recent cases where the powers of the foot are not weakened, will adhere and become perfect horn; but in old cases, it is requisite often to remove it, or thin it down with the knife, and to keep it soft and pliant with tar dressings to prevent irritation and exfoliation.

Some, instead of egyptiac, apply dry powdered verdigrise to the fore; others, butter of antimony; and some touch the surface with lunar caustic; others, again, use dilute nitrous acid, or marine acid; and some are fond of red lead boiled down, and mixed with the egyptiac, as making it more drying: these irritating measures, though of good effect at first, may be carried too far, and do mischief, and weaken the parts too much: it is of more consequence

to carefully remove all external irritation from the surrounding horn, and the employing of uniform, regular, and strong, but not excessive pressure, which, if assiduously followed with the milder application of tar, are equal to the cure of most cases, except such as from long disease have become so destroyed and weak, as not to be capable of forming, or afterwards holding horn upon them, or, as is sometimes the case, that the coffin-bone has been injured, and an exfoliating portion of it keeps up the sore, in spite of every endeavour to heal it, till this is removed, as we have met with in two instances. This injury of the coffin-bone may arise from a nail driven by accident out of its course into the side of the foot, and which, entering the bone, splinters and destroys a portion of it; or from the remedies used being of a too corrosive nature, or too violent pressure, that shall have destroyed the surface of it, which dying, acts as an extraneous body in preventing the parts from healing; or the horse, from stamping violently on the unprotected bone, from pain or otherwise, shall fracture its thin edges, and thus keeping up an irritation which shall defy every attempt of cure till these are removed, each of which we have seen cases of in the course of our practice; we may just remark, that where there is an exfoliating portion, it is best to remove it as early as possible, without waiting the tedious process of natural exfoliation: the wound thus formed being then of the nature of a fresh wound, will more readily heal, a practice, we believe, first recommended by that truly great character, Mr. John Hunter.

The above remedies also may be occasionally changed for each other with advantage, as the long continued application of one thing occasions it to lose its effect; and one agrees best with one subject, another with another, for which there can be no rule laid down.

By pursuing the above means steadily and uniformly for about nine months, the above tedious and desperate case was cured, and every part of the foot covered with horn: the horse was then turned to graze to encourage the more rapid growth of the horn. On his return from graze he was put to work, but suddenly died in a few months after of a liver complaint, which afforded an opportunity we had much sought for of examining the condition of the coffin-bone after a long existence of this complaint upon it, and also whether nature would restore the lost foliated substance of the hoof; and on examination, the foliated horn had been in a great measure repaired, and was growing down quite perfect; having covered two-thirds of the inside of the hoof where the canker had existed, and where it terminated, there was seen a smooth sort of cartilaginous surface on the inside of the hoof, and a similar one attached to the foot, so that these laid in contact with each other without *lamina*.

The sole which is less organized in its structure than the wall of the hoof, had no perceptible difference from the original sole. If the coronary ring and origin of the *lamina* had been destroyed, we should in that case doubt the possibility of their reproduction; for in this case, the coronary ring had been cautiously preserved. The coffin-bone had suffered greatly by the disease being considerably diminished on the side on which the sore had existed, and was become very porous, rough, and uneven; on its upper part near the coronary ring, a rough elevation of bone had been thrown out, of the size of a pea, such as is deposited in splints and spavins, being whiter and of not so dense a texture as the natural bone. The channel of the artery had also a thin white osseous deposit running to the inside of the heels of the coffin-bone, even where no sore had existed.

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In the course of the treatment of this disease in different subjects, we have had recourse to many different measures for keeping on the dressings to the foot; among others for this purpose we had made a leather boot, laced on its sides, with a wooden sole, defended at bottom by a thin ring of iron; this boot afforded the requisite pressure, but kept the foot, as we found by experience, too hot and moist, so that the horn was no sooner formed than it again exfoliated.

Flannel bandages were found to be subject to the same inconveniences. Shoes made with small hooks to the sides, passing the bands over the coronet, could not be applied for any length of time, from the skin of the coronet ulcerating from the pressure: we found on the whole nothing surpasses the application of pledgets of tow dipped in tar and tied round the foot, (when the sides were affected) with tar. An iron clip turned up from the shoe and passing parallel to the hoof was also found convenient when the sole was not extensive.

The last point is generally by far the most difficult to heal on the side of the foot; it will be found in general to be about opposite the circular artery of the coffin-bone, or its foramen: in the sole the most difficult point is the heel, and the junction of the sides of the frog with the sole: to get at these most conveniently, tow rolled up pretty tight between the hands, then immersed in the dressing, and thrust into the cavity, will be found a convenient way of getting at it; another roll being laid over this, and another till we arrive at the level of the sole, when a general pledget is applied over the whole.

At other times we thought it more convenient and advantageous, in sole cases, to pass the iron plate under the shoe, and then ram it full by pushing in the dressings through the openings of the heels.

If there be much moisture in the dressings, the case rarely goes on well. The plentiful use of tar seems to have the power of suppressing, in some manner, this transudation, and cannot be too much attended to, as it serves also to keep the wet from it, if the horse be used on the road.

A dry loose place is better in the cure of this complaint for the horse, than standing constantly in one position in a stall, where especially if it be in the hind legs, the blood accumulates with too much force from the declivity of the stall, their position being much lower than the rest of the body.

Exercise, if the lameness is not so great as to forbid it, is much to be recommended, and the occasional use of physic, especially where the horses stand still; a rowel also may be had recourse to with advantage, especially if there be any disposition to grease.

The frog, we have thought, appeared to be weaker in its powers of forming horn than the sole, and this than the wall; and the first horn is more apt to be undermined and exfoliate from this part, though it may appear fair to the eye: cells containing a white semifluid matter also arise under it and that of the sole, and are often the attendant of these exfoliations.

The cooler the foot can be kept, the more progress is made in the cure; therefore, much dressing or much covering is not so well, and water, though highly prejudicial, if applied for a constancy, yet may be used to wash the foot with, and afterwards being well wiped dry, the dressings are applied, as we have thought, with good effect. In some cases, where the fungus rises higher than the horn, and it may be an object to save the horn, it will be better to attack the fungus by carefully paring it with a knife till blood appears, and then use the desiccatives and pressure; at any rate by this

this means, less of the horn need be removed, as we get at it closer to the fungus than in the other case; and it is always of consequence where it can be done, to save all the horn possible, on account of its slow growth.

In dissecting away the offending points of horn, we have found it useful to observe the rule of beginning in the most depending parts of the foot, that if the blood starts, it shall not obscure the parts you are next to come to, as it would do if you commenced differently. If inadvertently a vessel is opened that is troublesome, it is most readily stopped by the point of the canter, without affecting the other part.

A kind of canker that is truly difficult of cure is the following.—A large draft horse that had occasionally been dressed by the smiths for more than a twelvemonth, had a canker of the near hind foot, with the following appearances: the frog was large and fleshy, with a smooth red surface that would form a hard shell of horn, loosely attached and quickly exfoliating; the sole every where bare of horn, having threads or fibres of considerable length, and hardened only at their extremity, their roots being inundated with a white milky secretion. After endeavouring ineffectually to harden these into horn, we cut them close off with a pair of scissars, and found that we made more progress upon the disorder: the parts, however, were so weak, that they appeared unable to retain the horn they had formed, and after several exfoliations of this sort, finding that little ground had been made, from the vicious disposition of the animal, probably made so by the long pain he had been exposed to, and the time it consumed as well as the assistance it required, we determined to abandon the case. Two or three of such cases have we seen, out of about twenty, some of which have been easily cured in a few weeks.

Having given some account of the disease itself, it will now be right to consider what is its cause, and if it can be prevented, for we fully concur in the words of Vegetius: (lib. 2. c. 58.) “*prestantius concilium est pedum tueri sanitatem quam passionem curare*,” preventive means are certainly the most wise, and after such a description of this disorder, there is no one, we should apprehend, that would not be anxious to avert it. We consider the most prevailing cause of this complaint to be the running thrush, which first only affects the cleft of the frog, but becoming aggravated, it gradually undermines the horn of the frog and spreads to its sides, and from thence to the sole, and so on to the wall and whole foot.

We remember one case where it appeared brought on by the grease, the discharge from which running down upon the frog, at length destroyed the horn, and brought on canker. Shaving the frog too close with the buttress would occasion this part to dry and crack, and wet getting into the cracks, and lodging there, would rot the frog and induce canker. Any wound of the frog or sole not healing kindly at first by the blood, such as a kennel nail wound, or any other description of wound, becoming irritated by the surrounding horn, would form a canker; however, these are rare cases compared with the one we have mentioned, viz. the running thrush, the common source of the mischief, which is certainly a consequence of the frog being squeezed together by the contraction of the heels, and this again arises from the nailing of an iron shoe permanently to the foot, for an account of which, see articles, *Foot of the horse*, and *FARRIERY*.

Such is the “brief chronicle” of our present experience in this disease, which, though avowedly imperfect, will serve as a more sure basis for receiving the facts of future labourers

than the hitherto almost useless accounts of this terrible disorder.

CANKER is also a disease in dogs, which seizes their ears. CANKER, in hawks, breeds in the throat and tongue, occasioned by foul feeding. It is cured by washing the mouth with honey and white wine boiled together, then strewing it with chervil-powder.

CANKER, *black*, in *Entomology* and *Husbandry*, a species of caterpillar, which has been occasionally destructive, in a very great degree, to the crops of turnips in Norfolk. The farmers in that county, observing great numbers of yellow flies among the turnips, previously to the appearance of these caterpillars, have been led to conclude, that the canker was the caterpillar state of the yellow fly; and from their frequent appearance on the eastern sea-coast it has been inferred, that they are not natives of this country, but that they come hither across the ocean. Their destructive ravages, however, have not been confined within a few miles of the eastern coast; but they have extended more or less into the centre of the county. From the description which Mr. Marshall has given of them, it appears that they have four wings; that their antennæ are clubbed, and about one-third the length of the body, each being composed of nine joints; and that near the point of the tail of the female there is a black speck outwardly fringed with hair, but which, opening longitudinally, appears to be the end of a case containing a sting, about one-twentieth of an inch in length, which, on agitation, separates into three one-edged instruments, with a spiral line or wrinkle winding from the points to the base, making ten or twelve revolutions, and giving them the appearance of being serrated. By means of these instruments, the female is supposed to deposit her eggs in the edge of the turnip leaf, or sometimes in the nerves or ribs on its under surface. The caterpillar has twenty feet (six of its legs being considerably long, and the other fourteen very short); and in its first stage is of a jet black, destitute of hair, but covered with innumerable wrinkles. Having attained its full size, it fixes its hinder parts firmly to the leaf of a turnip, or other substance, and breaking its outer coat or slough near the head, crawls out, leaving the skin fixed to the leaf, &c. The under coat, which now appears, is of a bluish or lead colour. The caterpillar in this state continues to feed on the turnips for some days longer; it then altogether desists from eating, and becomes covered with a dewy moisture which seems to exude from it in great abundance, and which, being of a glutinous nature, appears to form its chrysalis coat: Mr. Marshall concludes from the genuine characters of the fly, that it is *tenthredo* of Hill. See *TENTHREDO* and *TURNIP*. Phil. Transf. vol. 73. p. 227, &c.

CANNA, in *Botany*, (Heb. קנה Kane, a reed, whence our English word Cane is indisputably derived. *Kanna* is interpreted in the Greek Lexicons *ψαθος*, a mat, or according to Hesychius, the plant of which mats are made. It is larger than arundo and less than calamus,) Linn. Gen. 1. Schreb. 1. Willd. 1. Gart. 41. Juss. 63. Vent. vol. 2. 203. (Cannacorus, Tourn. 192.) Indian flowering reed, or Indian shot. Balisier, Fr. Class and order, *monandria monogynia*. Nat. Ord. *scitamineæ*, Linn. *canna*, Juss. *drymyrrhizæ*, Vent.

Gen. Ch. Cal. Perianth three-leaved, permanent; leaves lanceolate, erect. Cor. Monopetalous, six-cleft (eight-cleft; Salisb.) three outer segments erect, larger than the calyx; three inner segments larger than the outer ones, two erect, one revolute, forming a kind of lip. Stam. Filament resembling a petal, two-cleft; upper segment erect, bearing the anther; lower one revolute; anther linear, adhering to the edge of the upper segment of the filament. Pist. Germ inferior,

inferior, roundish, scabrous; style sword-shaped, resembling a petal, united at its base to the filament; stigma linear, adhering to the edge of the style. *Peric.* Capsule roundish-egg-shaped, crowned with the calyx, scabrous, three-furrowed, three-celled, three-valved; cells many-seeded. *Seeds* globular, affixed to a central receptacle.

Eff. Ch. Calyx three-leaved, corolla six-cleft, filament two-cleft; one segment revolute, style united at its base to the filament, capsule crowned with the calyx.

Observ. What is called the filament by Linnæus, Jussieu, Ventenat, and La Marck, is considered by Schreber as a nectary, and by Salisbury as constituting two other segments of the corolla.

Sp. 1. *C. indica*, Linn. Sp. 1. Gært. tab. 12. fig. 3. La Marck Illust. Pl. 1. Bot. Mag. 454. (Cannacorus, Rumph. Amb. 5. tab. 71. fig. 2. Katu-Bala; Rheed. Mal. 11. p. 85. tab. 43. *Arundo indica latifolia*, Bauh. pin. 19.) β Cannacorus amplissimo fol. flore rutilo; Tourn. Inf. 367. γ *C. coccinea*, Hort. Kew. γ *C. flore coccineo splendente*, Tourn. Inf. 367. δ *C. lutea*, Hort. Kew. β Cannacorus fl. luteo punctato, Tourn. Inf. 367. Riv. tab. 112. "Leaves egg-shaped, acuminate at both ends, nerved." Linn. "Leaves broad-lanceolate, smooth beneath; segments of the corolla revolute, nearly linear; inner ones less." Salisbury prod. Root thick, fleshy, horizontal, divided into many irregular knobs. Root-leaves egg-shaped, a foot long, and five inches long in the middle, with many large, transverse veins, prominent on the under side, running from the midrib to the sides; and between each of them two smaller, parallel, pointed veins. Stems three or four feet high, simple, upright, herbaceous. Stem leaves alternate, large, broad, egg-shaped, acuminate, sheathings smooth. Flowers red, in an upright, terminal, rather loose spike; almost sessile, growing alternately, two or three together in the axil of a short, spathaceous scale. A native of warm climates in Asia, Africa, and America. Its leaves are used to cover houses in Cayenne. Its root is regarded as diuretic and detergent. Its seeds dye a beautiful but not durable purple. 2. *C. angustifolia*, Linn. Sp. Pl. "Leaves lanceolate, petioled, nerved." Perhaps only a variety of the preceding species, but lower and narrower; and one of the lateral segments of the petal is so bent as to become the middle one. A native of spongy shady places within the tropics. 3. *C. glauca*, Linn. Sp. Pl. (cannacorus glaucophyllus: Dill. Elth. tab. 59. fig. 69.) "Leaves lanceolate, petioled, nerveless." Linn. "Leaves narrow-lanceolate, even on both sides; segments of the corolla spreading, inversely egg-shaped; inner ones less." Salisb. Roots large, striking strong fleshy fibres deep into the ground. Stems seven or eight feet high. Leaves near two feet long, narrow, smooth, of a glaucous colour. Flowers large, pale yellow, in short thick terminal spikes. Seed-vessels larger and longer than in the preceding species, with fewer and larger seeds. Cultivated at Eltham by Dr. Sherard in 1732. Raised by Mr. Miller in 1733 from seeds sent from Carthage in New Spain, which produced strong plants the first year, some of them flowering the same autumn. 4. *C. flaccida*. Salisb. Prod. p. 4. Icon. stirp. rar. 3. (*C. glauca* β , Willd.) "Leaves narrow-lanceolate, even on both sides; segments of the corolla flaccid, inversely egg-shaped: inner ones larger." A foot and half high or more, (four feet, Mart.) resembling *C. glauca*. Root horizontal, tuberous; fibres white, thick, fleshy. Stems several, pale sea-green, upright, simple, round, jointed, smooth, herbaceous, nearly, if not entirely, covered by the sheathing petioles. Leaves from five to seven, pale sea-green, alternate, shorter than the petioles or sheaths, spreading, entire, with a very thin mem-

branous edge, pointed at the end, very finely nerved, a little channelled above, keeled beneath, especially towards the base. Flowers from one to three, pale yellow, scentless, rather nodding; bractes two under each germ, blunt, entire, permanent; the outer one pressed close to the germ, the inner one longer and narrower, often spreading and incurved: calyx-leaves unequal, entire, obtuse: tube of the corolla much longer than the calyx, a little recurved; outer border a little longer than the tube, abruptly reflexed, deeply three-cleft; segments unequal, linear-lanceolate, entire, obtuse, thicker; inner border longer than the outer one, deeply five-cleft, segments tender, flaccid, much curled at the edges, the outer ones narrow, and nearly closed, the inner ones (segments of the filament, Linn. &c.) broader, inversely egg-shaped, emarginated; anther white, adhering to the edge of the inner side of the innermost segment, upright, linear, very minutely pointed, two-celled, opening in front; germ pale-green, oval, minutely tubercled: style very pale yellow, linear-spatula-shaped, smooth on both sides, flat; stigma white, slightly pubescent. *Pericarp* and *seeds* similar to those of the other species. Salisbury. A native of South Carolina, where it was found by Bartram. It is often mistaken for *C. glauca*. 5. *C. juncea*, Willd. Retz Obs. fasc. 1. p. 9. 2. 1. "Leaves linear, nerved." Leaves grass-like, with five raised nerves, sheathing at the base; those near the root covered with capillary fibres, from seven inches to a foot long. Flowers of a dusky rufous colour. *Pericarp* rough, with pointed tubercles. Retz. A native of China.

Propagation and Culture. All the species are perennial, and with proper management will continue many years: but as young plants always flower better than old roots, it is best to raise them annually from seeds which should be sown in a hot-bed in the spring. When the plants are fit to remove, they should be transplanted into separate small pots, filled with rich kitchen garden earth, and plunged into a moderate hot-bed of tanners-bark. In warm weather they should be supplied with fresh air every day and frequently watered. As they soon grow large, they should be shifted into larger pots, and part of them plunged into the same hot-bed; the rest may be placed abroad in June in a warm situation with other exotic plants. Those which are placed in the hot-bed will be strong enough to flower well in the stove in the following winter: but those in the open air will not flower before the following summer. In the beginning of October, they must be removed into the stove. The variety β of *C. indica*, which is a native of Carolina and some of the other northern states of America, being hardier, should be more early enured to the open air, where it may remain till the frost begins. It should be then removed to the green house, and during the winter should have but little water. In the beginning of May it may be turned out of the pot, and planted in a dry soil on a warm south border, where it will produce flowers annually. Miller.

CANNA, in Commerce. See CANE.

CANNA, in *Ancient Geography*, a small town of Asia Minor, in the Eolide. Mela.—Also, a town of Cappadocia, in Lycia. Ptolemy.—Also, a place of Asia, between Cyrra and Edeffa. Anton. Itin.

CANNABA, a place of Asia, in Syria, upon the route from Nicopolis to Edeffa. Anton. Itin.

CANNABICH, in *Biography*, a spirited and masterly composer of symphonies, of the Manheim school, contemporary with Stamitz and Hölzsbaut, about the middle of the last century. He was the most eminent solo player on the violin of his time: and his ballet of the descent of Hercules into the infernal regions, is a most beautiful production.

CANNABINA, in *Botany*, (folio tripartitum diviso. *C. Bauh. pin. 321.*) See *BIDENS TRIPARTITA*.

CANNABINA, (folio non diviso, *ibid.*) See *B. CERNUA*.

CANNABINA, (*indica*. *Magn. Hort. 40. tab. 40.*) See *VERESINBA ALATA*.

CANNABINA, *Tourn. Cor. 52. tab. 488.*) See *DATISCA CANNABINA*.

CANNABIS, (*καναβις*, *Herod. Dioscor.* It is not mentioned by *Theophrastus*.) *Linn. gen. 1115. Schreb. 1522. Gært. 463. tab. 75. fig. 1. Tourn. Inf. 535. tab. 309. Juss. 404. Vent. vol. iii. 536. Class and Order, diœcia pentandria. Nat. Ord. Scabridæ, Linn. Urticæ, Juss.*

Gen. Ch. Male. *Cal.* perianth five-cleft; segment oblong, acuminate obtuse, concave. *Cor.* none. *Stam.* filaments five, capillary, very short; anthers oblong, four-cornered. Female. *Cal.* perianth one-leafed, oblong, acuminate, opening longitudinally on one side, permanent. *Cor.* none. *Pist.* germ very small; styles two, very long; stigmas acute. *Peric.* the permanent calyx closely covering the seed. *Seed*, nut globular, depressed, two-valved.

Eff. Ch. Male. Calyx five-cleft; corolla none. Female. Calyx one-leafed, entire, opening on one side; corolla none; styles two; nut two-valved, within the closed calyx.

Sp. 1. *C. sativa*, *Linn. Sp. Pl. Mil. fig. tab. 77. Bauh. Hist. i. fig. 448. Ger. Emac. 708. fig. 1, 2. Lam. Ill. Pl. 814. Hemp. Chanvre, Fr. "Leaves opposite." Root annual. Stem from six to eight feet high or more, upright, obscurely quadrangular, a little hairy. Leaves petioled, digitate; leaflets five or seven, lanceolate, acuminate, serrated, outer ones the smallest. Male flowers in small loose racemes or spikes at the ends of the stem and branches. Female flowers, axillary, solitary, very small. Both kinds sometimes occur on the same plant, but always one of them very few in proportion to the other. All the old authors ignorantly call the male flowers female, and vice versa. It is said by *Herodotus* to be a native of *Scythia*. According to *Linnæus* it grows wild in the *East Indies*. *Thunberg* says it grows here and there in *Japan*. *Gmelin* found it in *Tartary*, and *Father Hennepin* among the *Illinois*, in *North America*. From long cultivation it is almost naturalized in the south of *France*, *Italy*, &c. An oil is extracted from its seeds. The seeds themselves are thought to be good for poultry, and to cause hens to lay a larger quantity of eggs, but should be given to smaller birds with caution, and mingled with other seeds. It has been said, that if *bullfinches* and *goldfinches* feed upon them too plentifully, the red and yellow of their plumage is changed to a total blackness. For the propagation and culture of this plant, the various processes which it undergoes in the hands of the manufacturer, and the uses to which it is applied, see *Hemp*. 2. *C. indica*, *Lam. Encyc. (C. similis exotica, Bauh. pin. 320. C. peregrina, Morif. Hist. iii. p. 433. n. 2. Kalengi-Cansjava, Rheed. Mal. 10. p. 119. tab. 60. Tsjern-Cansjava, Ibid. tab. 61. Dakka or Bangua of the Indians. β. With a taller stem. Rumph. Amb. v. p. 208. tab. 77. "Leaves alternate." Stem nearly cylindrical, smaller, more branched, and harder than that of the preceding species. Leaves all constantly alternate; leaflets linear-lanceolate, very sharp-pointed; in the male plants five or seven, in the female ones commonly but three, on a petiole; near the top entirely simple. A native of the *East Indies*. Its hard stem and thin bark render it incapable of being wrought into filaments and spun like common hemp. It has a strong smell, a little like that of tobacco. The *Indians* make of its bark and the expressed juice of its leaves and seeds, a liquor**

which has an intoxicating quality; and if they wish to produce a stronger effect, they either chew or smoke its dried leaves mingled with tobacco. A little nutmeg, cloves, camphor, and opium, mixed with its juice, form the composition which the *Indians* call *majeh*, and which, according to *Clusius*, is the same as the malach of the *Turks*.

CANNABIS *Spuria*, (*Riv. Mon. tab. 32.*) See *GALEOPSIS VERSICOLOR*.

CANNABIS *Virginiana*, (*Bauh. Pin. 320.*) foliis simplicibus, (*Gron. Virg. 192. 155**.) See *ACNIDA CANNABINA*.

CANNABIS *lutea fertilis*, (*Alp. Exot. 300. tab. 298. Morif. Hist. tab. 25. fig. 4. lutea cretica et sterilis, Alp. Exot. 296. tab. 295, and 301. tab. 300.*) See *DATISCA CANNABINA*.

CANNACORUS. See *CANNA*.

CANNÆ, the second order of the fourth class of the natural orders of *Jussieu*, with the following character. *Calyx* (corolla, *Linn.*) superior, coloured; divided into several, often fix, petal-shaped, generally unequal and irregular segments; with three others exterior and smaller, putting on the appearance of an external calyx, (the proper calyx, *Linn.*) *Stamen* one; filament inserted into the base of the style, often flat and petal-shaped; anther adhering, simple, or rarely double. *Germ* inferior; style simple, often thread-shaped; stigma simple or divided. *Capsule* inferior, three-celled, most frequently three-valved, and many-seeded. *Root* often tuberous, creeping. *Stem* herbaceous, covered with the sheathing petioles. *Leaves* alternate, sheathing, younger ones convolute, some many-nerved, others sending out parallel nerves from each side of a simple midrib. *Flowers* in spathes, often growing on a cauline, or radical spadix. The genera assigned to this order by *Jussieu* are *catimbium*, *canna*, *globba*, *myrosma*, *amomum*, *costus*, *alpinia*, *maranta*, *thalia*, *curcuma*, and *kæmpferia*.

CANNÆ, in *Ancient Geography*, a small town of *Italy*, in *Apulia*, seated on the river *Aufidus*, now called *Ofanto*. The *Latins* use the plural appellation for this city, probably from its consisting of distinct parts, built on different eminences. The *Greeks*, and *Polybius* in particular, called it *Kann*, in the singular number. This place has been rendered famous in history by the battle fought in its vicinity between the *Carthaginians* and the *Romans*, in the year of *Rome*, 538, *B. C.* 216. For some time previous to this battle, *Hannibal*, the *Carthaginian* general, had, by various movements and skirmishes, endeavoured to bring *Fabius*, the wise and wary *Roman* dictator, to a decisive contest. He well knew that inaction and delay were the principal evils he had to fear, and the distress occasioned by want of provisions and money made him anxious to provoke the *Romans* to an engagement. *Fabius*, on the other hand, duly apprized of the situation of his adversary, adopted every prudent measure for protracting the war, and ruining his enemy by delay. Some trivial successes which were gained by the *Romans* in their encounters with the *Carthaginians*, increased the confidence both of the army and of the people: and forgetting their former defeats, they began to imagine that the enemy maintained his station in *Italy*, by the permission, by the timidity, or by the excessive caution of their leader. *Minutius*, the general of the horse, having also, in the absence of the dictator, obtained some slight advantage over the foraging parties of *Hannibal*, the army and the people were confirmed in this opinion, and the reputation of *Fabius* was greatly sunk in their estimation. But as he could not be superseded till the usual term of his office expired, the senate and people adopted a measure, which they hoped would induce him to resign. They raised the general of the horse to an equal

equal command with the dictator, and left them to adjust their respective pretensions. The Roman dictator, instead of rashly and indignantly withdrawing his services in a moment of danger, continued to serve under this diminution of rank and command, and magnanimously overlooked the insults with which the people had requited the service he was rendering to his country. Minutius being now associated with the dictator, in order to be free from the restraints of a joint command, and from the wary counsels of his colleague, desired, as the most proper mode of adjusting their pretensions, to divide the army between them. In this new situation he exposed himself and his division, by his rashness, to the danger of being entirely cut off by the enemy; but being rescued by Fabius, he acknowledged the favour he had received, and committing himself, with the whole army, to the conduct of his colleague, he left this cautious officer, during the remaining period of their joint command, to pursue the plan which he had formed for the war, and to which, without overbearing interference, he determined to adhere. The people, and the senate, however, were not disposed to acquiesce in what they conceived to be the languid and dilatory measures which Fabius was inclined to pursue. Having resolved to augment the army in Italy to eight legions; which, with an equal number of the allies, amounted to 80,000 foot and 7200 horse, which they conceived would be a force more than sufficient to counteract that of the Carthaginians, which consisted of 40,000 foot, and 10,000 horse; they intended, on occasion of the approaching election of consuls, to chuse men, not only of reputed ability, but of decisive and resolute counsels. Accordingly, they elected C. Terentius Varro, supposed to be of a bold and dauntless spirit; and, with a view of tempering his ardour, they joined with him in the command L. Æmilius Paulus, an officer of approved experience, who had formerly obtained a triumph for his victories in Illyricum, and who stood high in the confidence of the senate, as well as in that of the people.

The autumn before the nomination of these officers to the command of the Roman army, Hannibal had surprised the fortress of Cannæ, whither the Roman citizens of that quarter had retired with their effects, and where they had collected considerable magazines and stores. This, among other circumstances, determined the senate to hazard a battle, and to furnish the new consuls with instructions to this effect. These officers, having opened the campaign on the banks of the Aufidus, advanced by mutual consent within six miles of the Carthaginian camp, which covered the town of Cannæ. Here they differed in their opinions; and a compromise was made by an agreement, that each of them should alternately take the command for a day. Varro, in opposition to the sentiments of his colleague, proposed to give battle on the plain, and for this purpose, as often as the command devolved upon him, still advanced on the enemy. In order to occupy the passage and both sides of the Aufidus, he encamped in two separate divisions on its opposite banks, having his larger division on the right of the river, opposed to Hannibal's camp. Still taking the opportunity of his turn to command the army, he passes with the larger division to a plain, supposed to be on the left of the Aufidus, where, as the field was too confined to receive the legions in their usual form, he pressed them together, and gave the enemy, if he chose it, an opportunity to engage. For the accommodation of his order to the extent of his ground, he contracted the head, and the intervals of his maniples or columns, making their depth greatly to exceed the front which they turned to the enemy. He placed his cavalry on the

flanks, the Roman knights on his right towards the river, and the horsemen of the allies on the left. Varro, having thus arranged his force, and impelled by vanity, in consequence of having obtained some slight advantages by skirmishes between the light horse, or exasperated by an insult of the Numidians, who had pursued a body of Romans almost to the gates of the camp, determined to bring the contest to a speedy conclusion. Paulus Æmilius disapproved of the place which he had chosen for the scene of battle, but wished to draw the enemy to a situation, where the infantry, in the number of which they exceeded, might have the greater share in the action, whereas Hannibal's cavalry was in every respect superior to that of the Romans; and remonstrated against the precipitance of his colleague. Paulus Æmilius commanded the right of the Romans, Varro the left, and Servilius Geminus, the consul of the preceding year, was in the centre. Hannibal, as soon as he saw the movement and disposition of the enemy, hastened to meet them on the plain which they had chosen for the field of action. He likewise passed the Aufidus, and with his left to the river and his front to the south, formed his army upon an equal line with that of the enemy. He placed the Gaulish and Spanish cavalry on his left facing the Roman knights, and the Numidians on his right facing the allies. The flanks of his infantry, on the right and the left, were composed of the African foot, armed in the Roman manner, with the pilum, the heavy buckler, and the stabbing sword. His centre, though opposed to the select portion of the Roman legions, consisted of the Gaulish and the Spanish foot, variously armed and intermixed together. Asdrubal commanded the left, Hanno the right, and Hannibal with his brother reserved the command of the centre to himself. As the armies fronted north and south, even the sun, which rose soon after they were formed, shone upon the flanks, and was no disadvantage to either of them. Some difficulty has occurred in deciding which way each of these armies was turned; as the expressions of Polybius are said by some to admit of a double meaning. His words are "Βλεπῶντος δὲ τῆς μὲν τῶν Ῥωμαίων τάξεως πρὸς μεσημβρίαν τῆς δὲ τῶν Καρχηδονίων πρὸς τὰς ἀρκίας ἐκατέρους ἀβλαπῆ συνέβαινε γίνεσθαι τὴν κατὰ τὸν ἥλιον ἀνατολήν." Spectante meridiem Romanorum acie, Carthaginensium vero septentrionem, ambobus inoffensis contigit esse ab solis ortu. Livy is charged by Chaupy with having misinterpreted the passage of the Greek historian, who, according to his opinion, did not mean, that the Romans stood with their faces to the noon-tide sun; but only that they were drawn up to the south of the enemy. Livy's words are (lib. xxii. 46.) "Romanis in meridiem, Pænis in septentrionem versis." He affirms, moreover, that the topography of the plain, and the course of the river, agree with this explanation; and that if the legions had faced the south, the runaways could not, after the defeat, have reached Canusium and Venusia, without passing through the whole victorious army. Salapia, Arpi, and Luceria, would have been their places of refuge. Swinburne inclines to trust to the explanation of Livy, who was sufficiently acquainted with the Greek language not to mistake the meaning of an author whom he studied and followed so closely; more especially as, according to his ideas, the situation of the ground is in favour of the Roman historian; for exactly in that part of the plain where we know with moral certainty that the main effort of the battle lay, the Aufidus, after running due east for some time, makes a sudden turn to the south, and describes a very large semicircle. The Romans, we are to suppose, forded it at the angle or elbow, and placed their right wing on the banks; while the legions extended themselves

selves due east, till the whole line came to face the south. The Carthaginians crossed in two places within the semicircle; and were drawn out in a line, that formed the chord of which the river was the arch; and therefore the way to Canusium was open for the fugitives. Swinburne adds, that the scene of action is marked out to posterity by the name of "Pezzo di Sangue," or field of blood. The peasants, he says, shewed us some spurs and heads of lances lately turned up by the plough, and told us, that horse-loads of armour and weapons had been at different times carried away from thence. Livy (l. xxii. 13.) and Plutarch (in Fab. p. 183.) inform us, that Hannibal, who knew how to avail himself of circumstances, as a great captain, forgot nothing that could conduce to the victory. A wind peculiar to that region, called in the country the "Vulturus," blew always at a certain period. He took care to draw up in such a manner, that his army, facing the north, had it in their backs, and the enemy, fronting the south, had it in their faces; so that he was not in the least incommoded by it: whereas the Romans, whose eyes it filled with dust, scarcely saw before them. The superiority of numbers was greatly on the side of the Romans; but Hannibal rested his hopes of victory on two circumstances: first, on a motion to be made by his cavalry, if they prevailed on either of the enemy's wings; next, on a position he was to take with his centre, in order to begin the action from thence, to bring the Roman legions into some disorder, and expose them, under that disadvantage, to the attack which he was prepared to make with his veterans on both their flanks. The action accordingly began with a charge of the Gaulish and Spanish horse, who, being superior to the Roman knights, drove them from their ground, forced them into the river, and put the greater part of them to the sword. By this event the flank of the Roman army, which might have been joined to the Aufidus, was entirely uncovered. Having performed this service, the victorious cavalry had orders to wheel at full gallop round the rear of their own army, and to join the Numidian horse on their right, who were still engaged with the Roman allies. By this unexpected junction, the left wing of the Roman army was likewise put to flight, and pursued by the African horse; at the same time the Spanish cavalry prepared to attack the Roman infantry, wherever they should be ordered on the flank, or the rear. While these important events took place on the wings, Hannibal amused the Roman legions of the main body with a singular movement that was made by the Gauls and Spaniards, and with which he proposed to begin the action. These came forward, not in a straight line abreast, but swelling out to a curve in the centre, without disjoining their flanks from the African infantry, who remained firm on their ground. By this motion, they formed a kind of crescent convex to the front. The Roman maniples of the right and the left, fearing by this singular disposition to have no share in the action, hastened to bend their line into a corresponding curve; and, in proportion as they came to close with the enemy, charged them with a confident and impetuous courage. The Gauls and Spaniards resisted this charge no longer than was necessary to weaken the precipitant ardour with which victorious troops often blindly pursue a flying enemy. And the Roman line being bent, and fronting inwards to the centre of its concave, the legions pursued where the enemy led them. Hurrying from the flanks to share in the victory, they narrowed their space as they advanced, and the men who were accustomed to have a square of six feet clear for wielding their arms, being now pressed together, so as entirely to

prevent the use of their swords, found themselves struggling against each other for space, in an inextricable and hopeless confusion. Hannibal, who had waited for this event, ordered a general charge of his cavalry on the rear of the Roman legions, and at the same time an attack from his African infantry on both their flanks: by these dispositions and joint operations, without any considerable loss to himself, he effected an almost incredible slaughter of his enemies. With the loss of no more than 4000 Gauls, 1500 Spaniards and Africans, and 200 horses, he put 50,000 of the Romans to the sword. Polybius says the general loss amounted to more than 70,000. The Carthaginians were so furious against the enemy that they did not cease killing till Hannibal, in the greatest heat of the conflict and slaughter, exclaimed several times, "Hold, soldiers, spare the vanquished." The consul Æmilius Paulus had been wounded in the shock of the cavalry; but when he saw the condition in which the infantry were engaged, he refused to be carried off, and was slain. "I have taken my resolution," said he. "I will expire upon these heaps of my dead soldiers: but do you take care not to lose the time you have for escaping from the enemy, through an useless compassion. Go, and tell the senate from me to fortify Rome, and to make troops to enter it for its defence, before the victor arrives to attack it. Tell Fabius in particular, that I lived and died highly sensible and fully convinced of the wisdom of his counsels." The consuls of the preceding year, with others of the same rank, were likewise killed: of 6000 horse only 70 troopers escaped with Varro. Of the infantry, 3000, or according to other accounts, 4000, fled from the carnage that took place on the field of battle, and 10,000, who had been posted to guard the camp, were taken; others retired to Canusium.

The unfortunate consul with such of the stragglers as joined him in his retreat, took post at Venusia, and afterwards at Canusium, where he joined a considerable number of those that had escaped; and with a noble confidence in his own integrity, and in the resources of his country, put himself in a posture to resist the enemy, till he obtained further instructions and reinforcements from Rome. On his return to the city, the senate, conscious that he had acted at Cannæ by their own instructions, and, that influenced by the motives that animated the whole Roman people, he had disdained, with a superior army, to stand in awe of his enemy, or to refuse him battle upon equal ground, went out in a kind of procession to meet him; and overlooking his temerity and misconduct in the action, they attended only to the undaunted aspect which he preserved after his defeat, and returned him thanks for not having despaired of the commonwealth. From this time they continued their preparations for war with all the dignity and pride of the most prosperous fortune. They refused to ransom the prisoners who had been taken by the enemy at Cannæ, and treated with full contempt, rather than severity, those who by an early flight had escaped from the field; and when they were petitioned to employ them again in the war, they replied, "we have no service for men who could leave their fellow-citizens engaged with an enemy." On the part of Hannibal, this victory was complete; but his subsequent inactivity saved Rome and her dominions. Many, and Livy amongst the rest, condemn Hannibal for his delay in properly improving this signal success, as a capital error. But others, restrained by the authority, or rather the silence of Polybius, have forbore from censuring the conduct of the Carthaginian general. He allows, indeed, that the Carthaginians entertained hopes of carrying Rome on the first assault;

affault; but he does not explicitly declare his own opinion concerning the measures which might have been prosecuted in respect to a city very populous, extremely warlike, well fortified, and defended by a garrison of two legions. He does not so much as intimate that such a project was practicable, or that Hannibal was to be blamed for not having attempted it. It should be considered, that after the battle he had not more than 26 or 27 thousand foot, who were in a condition to act; and that number could not suffice either for forming the circumvallation of a city of such extent as Rome, with a river running through it, or for attacking it in form, without machines and other implements necessary in a siege. The victory at Cannæ afforded to Hannibal a very considerable booty: but except men, horses, and a little silver which was principally upon the furniture of the horses, he abandoned all the rest to the soldiers. After the battle of Cannæ, Hannibal took up his winter quarters at CAPUA, which see. Polybius, iii. 262-267-298. Livy, xxii. 43-44-54. Plut. in Fab. 182-184. Rollin's Anc. Hist. vol. i. Rollin's Rom. Hist. vol. iii.

The plains on which the battle of Cannæ was fought, have more than once, since the Punic war, afforded a scene of warfare and blood. Melo of Bari, after raising the standard of revolt against the Greek emperors, and defeating their generals in several engagements, was at last routed here, in 1019, by the catapan Bolanus. Out of 250 Norman adventures, the flower of Melo's army, no more than ten escaped the slaughter of the day. In 1201, the archbishop of Palermo and his rebellious associates, who had taken advantage of the nonage of Frederick of Swabia, were cut to pieces at Cannæ by Walter de Brienne, sent by the pope to defend the young king's dominions. The remaining traces of the town of Cannæ are very faint; and consist of fragments of altars, cornices, gates, walls, vaults, and underground granaries. It was destroyed, as we have already observed, the year before the battle; but being rebuilt, it became an episcopal see in the infancy of Christianity. It was again reduced in the 6th century; but seems to have subsisted in an humble state many ages later; for we read of its contending with Barletta for the territory which till that time had been enjoyed in common by them: and in 1284, Charles the first issued an edict for dividing the lands to prevent all future litigation. The prosperity of the towns along the coast, which increased in wealth and population by embarkations for the crusades, and by traffick, accelerated the annihilation of the inland cities; and Cannæ was probably abandoned entirely before the end of the 13th century. It is now an inconsiderable place, with a titular see, in the country of Bari. Swinburne's Travels, &c. vol. i.

CANNAGARA, a town of India, placed by Ptolemy on the other side of the Ganges.

CANNAR, or CANNATUM, a promontory of Africa, in the Mediterranean Sea, in Mauritania Tingitana, according to the Itinerary of Antonine.

CANNARES, Indians of the province of Quito, in Peru. They are well made and very active; they wear their hair long, which they weave and bind about their heads, in form of a crown. Their clothes are made of wool or cotton, and they wear fine-fashioned boots. Their women are handsome and fond of the Spaniards; they generally till and manure the ground, whilst their husbands at home card, spin, and weave wool and cotton. Their country had many rich gold mines, which have been drained by the Spaniards. The land bears good wheat and barley, and has fine vineyards. The magnificent palace of "Theomabamba" was situated in the country of the Canares.

CANNAVAROLA, in *Ornithology*, the name assigned by Aldrovandus to the babbling warbler, *MOTACILLA CURRUCULA* of Linnæus.

CANNAVERAL, CAPE, in *Geography*, the extreme point of rocks on the east side of the peninsula of East Florida, having the Mosquitos inlet N. by W. and a large shoal S. by E. This was the boundary of Carolina by charter of Charles II. N. lat. 28° 35'. W. long. 31° 9'.

CANNAYAH, a village of the north side of Washington island, on the N.W. coast of North America.

CANNEL-COAL. See COAL.

CANNELE', in *Zoology*, a species of biped reptiles in the arrangement of De la Cèpede, in the first volume of his "History of oviparous Quadrupeds and Serpents." The other species of this genus is the shetopufik, described by Pallas in the Petersburg Transactions.

The cannelé is an animal lately discovered in Mexico by M. Vélafques, and brought into France by the viscountess de Fontanges. Its whole length is 8½ inches, and its diameter the third of an inch; the abdominal semi-rings are 150, and the tail-rings 31; the thickness of the whole body is nearly equal; the legs, one-third of an inch long, are close to the neck, and the feet have each four toes furnished with nails. The cannelé seems to have a near resemblance to the amphibæna of Linnæus, and perhaps, when it is better known, it may be found to belong to that genus; though, at the same time, the legs justify the genus as established by the count De la Cèpede.

CANNEQUINS, in *Commerce*, white cotton cloths brought from the East Indies. They are a proper commodity for trading on the coast of Guinea, particularly about the rivers Senegal and Gambia. These cloths are folded square-wise, and are about eight ells long.

CANNES, in *Geography*, a small town and harbour of France in the department of the Var, and district of Grasse, which gives name to a bay formed by Cape Garaup or Garoupe. N. lat. 43° 34'. E. long. 7° 7'.

CANNESIS, a town of Louisiana, on the north bank of Red River, a branch of the Mississippi.

CANNETE, a town of Spain, in the province of Cordova; 18 miles E. of Cordova.—Also, a town of Spain, in the province of Seville; 5 leagues S. of Ossuna.

CANNETS, Fr. in *Heraldry*, ducks represented without beaks or feet. Cannets have their heads in profile, and they differ from *Allerions*, which are always displayed and full-faced, and they have longer and more encircling necks than those of the martlets.

CANNETTE, in *Geography*. See CAGNETE.

CANNIA, a place in the island of Ceylon, about six miles from the fort of Trincomalee on the road to Candy, famous for its springs, the waters of which are reckoned very efficacious in rheumatic complaints. The springs are six in number, and of different degrees of heat; they all communicate with one another, and exhibit the same phenomena. Their heat varies from 98° to 106½° of Fahrenheit's thermometer, nearly in proportion to their different depths. From an analysis of these waters it appears that they possess few mineral qualities, or perhaps any virtue besides their heat, which is of a temperature not unfavourable for hot bathing. Percival's Ceylon, p. 360.

CANNIBAL, or CANIBAL, is used by modern writers for an *anthropophagus*, or man-eater, more especially of the West Indies. See ANTHROPOPHAGI.

In the ancient world, tradition has preserved the memory of barbarous nations of cannibals, who fed on human flesh, and in every part of the new world there were people to whom

whom this custom was familiar. It prevailed in the southern continent in several of the islands (See CARIBBEES), and in various districts of North America. Even in some parts where the practice has been abolished, it seems formerly to have been so well known, that it is incorporated into the idiom of their language. Among the Iroquois, the phrase by which they express their resolution of making war against an enemy is "Let us go and eat that nation." If they solicit the aid of a neighbouring tribe, they invite it to eat broth made of the flesh of their enemies." Nor was this practice peculiar to rude unpolished tribes: the principle from which it took rise is so deeply rooted in the minds of the Americans, that it subsisted in Mexico, one of the civilized empires of the new world, and relics of it may be discovered among the more mild inhabitants of Peru. It was not scarcity of food, as some authors imagine, and the importunate cravings of hunger, which forced the Americans to these horrid repasts on their fellow-creatures. Human flesh was never used as common food in any country. It was the rancour of revenge that first prompted men to this barbarous action. The fiercest tribes seldom devoured any but prisoners taken in war, or such as they regarded as enemies.

This fact is confirmed by two remarkable circumstances, which occurred in the conquest of different provinces. In the expedition of Narvaez into Florida, in 1528, the Spaniards were reduced to such extreme distress by famine, that in order to preserve their own lives, they ate such of their companions as happened to die; this appeared so shocking to the natives, who were accustomed to devour none but prisoners, that it filled them with horror and indignation against the Spaniards. During the siege of Mexico also, though the Mexicans devoured with greediness the Spaniards and Tlascalans, whom they took prisoners, the utmost rigour of the famine which they suffered could not induce them to touch the dead bodies of their own countrymen. The authorities for these facts are cited in Dr. Robertson's Hist. of America, vol. ii. p. 501. See ANTHROPOPHAGY. See also the articles AMERICA, ANSIKO, BATTÀ, SURINAM, and NEW ZEALAND.

CANNOCK, or CANNOT-stone, a base sort of iron-ore, in the Staffordshire mines, of which the worst metal is made.

CANNON, in French *canon*, from the Italian word *canone*, which is derivable from the Greek word *κανών*, signifying the beam of a steelyard or balance, a reed, cane, rod, or ruler, &c.; or from *κάννα*, in Latin *canna*, a cane, reed, fugar-cane, pipe, &c. This word, in its general acceptation, is applied not only to large guns, howitzers, mortars, carro-nades, &c. and all heavy pieces of ordnance or artillery, but also to the barrels of all smaller sized fire-arms, such as muskets, carabines, fuses, pistols, &c. whether the bores of the same be smooth on the inside or rifled. In its more restricted and ordinary acceptation, however, it is made use of to express a large-sized fire-arm, a piece of ordnance or artillery, a warlike engine, machine, or instrument for projecting or throwing balls, bullets, shells, grape-shot, stones, &c. &c. by means of gunpowder. It has a cylindrical bore or tube running lengthwise in the middle of it from the muzzle towards the breech for receiving the charges of powder, shot, shells, &c. After gunpowder began to be applied to military purposes, it supplanted and succeeded the *tormenta bellica*, or warlike machines of the ancients. The first cannons were called *bombarde*, from *βουβός* or "a bombo et ardore," on account of the great noise, which the firing of them occasioned; and as they succeeded to these machines, they were employed like them for throw-

ing large stones, and had prodigious calibers. Their forms, as well as the engines and instruments made use of for managing, moving, and conducting them, were only such as the most obvious incidents suggested, or the rudest and most uncultivated invention dictated. They usually consisted of bars or pieces of iron fitted, and sometimes soldered together lengthwise, and hooped with iron rings. Being long beyond all just or due proportion; they were heavy, clumsy, and in a great degree unmanageable; and as they were used for throwing stones, like the machines they succeeded, they were necessarily of a huge or enormous bore, and could not be fired but at great intervals of time. Such were those with which we are told M-homet II. battered the walls of Constantinople in the year 1453, being some of them of the caliber of no less than 1200 pounds. Though some use had been made of guns in Europe upwards of a century before, so little improvement had been made in their construction that they could not be fired above three or four times a day or discharged often without bursting. And Guicciardin, in the first book of his history, informs us, that so great a portion of time intervened between the different chargings and dischargings of one of those ponderous and unwieldy pieces, that the besieged had sufficient time to repair at their leisure the breaches made in their walls by the shock of the huge and enormous stones, that were thrown from them. For a considerable time, indeed, after men began to apply gunpowder to military purposes, their guns were very long, heavy, and unmanageable, and of course very unfit for quick or expeditious service. Military people at that time possessed but a small share of learning of any kind, and almost none at all of a mechanical or mathematical nature. What they did professionally in regard to the management of artillery was entirely the effect of practice and a bare repetition of what they saw every day done.

But as mathematical knowledge increased in Europe, that of mechanics gradually advanced, and enabled artists by making both brass and iron cannon of a much smaller bore for receiving iron bullets, and a much greater charge of strong powder in proportion to their calibers, to produce a very material and important change in the construction and fabric of those original pieces. Accordingly this historian, in the same book of his history, informs us, that about 114 years after the first use made of those ponderous and unwieldy pieces by the Venetians, in the war which they carried on against the Genoese in the year 1380, the French were able to procure for the invasion of Italy a great number of brass cannon, mounted on carriages, drawn by horses instead of oxen; and that these pieces could always keep pace with the army.

In enumerating the advantages, which arose from this alteration in the structure and management of artillery, he observes, that the pieces were pointed with incredible quickness and expedition in comparison of those formerly made use of in Italy, were fired at very small intervals of time, and could produce in a few hours an effect, which those others could not have produced in the space of many days. In speaking of these matters he uses the following words.

"Et per unerfi con questo esercito erano state condotte per mare a Genova quantità grande d'artiglierie da battere le muraglie et da usare in campagna, ma di tal sorte, giammai non havava veduta Italia le semighanti. Questa peste trovata molt' anni innanzi in Germania fu condotta la prima volta in Italia da Venetiani nella guerra, che circa l'anno della salute 1380 hebbono i Genovesi con loro—Il nome delle maggiori era bombarde, le quali, sparsa dopo questa invention per tutta Italia s'adoperavano nell' oppugnationi delle terre, alcune di ferro, alcune di bronzo ma grossissime,

ssime, in modo che per la machina grande et per l'imperitia de gli huomini et mala attitudine de gl' instrumenti tardissimamente et con grandissima difficulta si conducevano, piantavansi alle terre co' medesimi impedimenti et piantate era dall' un colpo all' altro tanto intervallo, che con piccolissimo frutto, a comparatione di quello, che seguito dopo molto tempo consumavano, donde i defensori de luoghi oppugnati havevano spatio di potere otiosamente fare di dentro ripari et fortificationi. Ma i Francesi fabricando pezzi molto più espediti, nè d'altro che di bronzo, i quali chiamavano cannoni, et usando palle di ferro, dove prima di pietra et senza comparatione piu grosse et di peso gravissimo s'usavano li conducevano in sulle cerette tirate (non da buoi come in Italia si costumava) ma da cavalli con agilita tale d'huomini et d'istrumento deputati a questo servizio, che quasi sempre al pari de gli eserciti camminavano, et condotte alle muraglie erano piantate con prestezza incredibile, et interponendosi dall' un colpo all' altro piccolissimo intervallo di tempo si spesso et con impeto si gaghardo percuotevano, che quello che prima in Italia fare in molti giorni si soleva do loro in pochissime hore si faceva."

These pieces used generally to throw iron-balls from forty to sixty pounds in weight; and thus change in the formation of artillery has not as yet undergone many material alterations. Lighter guns indeed are now employed than those, that were made use of at first; but they have suffered greater variations in respect of size than proportion.

When, or by whom, guns were first invented is uncertain, since the origin both of them and of gun-powder is involved in obscurity; though it is highly probable, that mixtures or compositions similar to that of gun-powder were made soon after the discovery of salt-petre, because it is difficult to conceive how the one discovery could exist long without the other.

The great increase of inflammability, which salt-petre gives to igneous or inflammable substances, when mixed with them, must soon after it was discovered itself have led to such a mixture. For a small part of it being either thrown or falling accidentally into any fire must have manifested this distinguishing quality in it and its prodigiously explosive power when mixed with burning bodies, and have led to the idea of rendering inflammable materials violently and excessively more so than they are naturally, and powerfully explosive, by mixing them with salt-petre. If the time could, therefore, be ascertained when this substance first came to be made use of, conjectures might with some sort of certainty, or at least probability, be formed when mixtures like the composition of gunpowder were first made or invented. Such a discovery or invention, however, might long exist before a convenient and advantageous method of applying it to military projectiles might be thought of or suggested.

An opinion has generally prevailed, that salt-petre was first discovered either by the Arabians or the later Greeks, about the middle ages of the christian æra, when alchemy and chemistry were much attended to and cultivated by both nations. It is even said that the Arabic name for it is expressive of its explosive quality. And if the Greek fire made use of by the later Greek emperors possessed this explosive property, and produced the effects attributed to it, there must have been some salt-petre in its composition.

Whether salt-petre was known to the ancients, seems to be a matter of considerable uncertainty. They had, however, both in Europe and Asia, their fiery tubes or cannae, which, being loaded with stones, pitch, and iron balls, were exploded with a violent noise, much smoke, and great effect. And there are several passages, both in the Greek and Ro-

man writers, which shew, that the Greek fire itself was used by both nations in their wars, and afford reasons for tracing it back to a much earlier date than 660, or the sea fight in the Hellespont, commanded by Constantine Pogonates against the Saracens, and ascribing the invention of it to Marcus Gracchus or Græcus.

The invention of gunpowder is usually, though erroneously, ascribed to one Bartholdus Schwartz, who is said to have discovered it about the year 1320; and the Venetians are commonly supposed to have made the first application of it to military purposes in their war against the Genoese about the year 1380. Both of these suppositions, however, are certainly without foundation. For Roger Bacon, who lived almost fifty years before Schwartz, describes a composition perfectly resembling that of gunpowder; and unquestionable proofs can be produced of the use of artillery much earlier than the year 1380, even in Europe.

Bacon does not mention this composition as a new one, but speaks of it as in common use for recreative fire-works, and only proposes to apply a well known one to the destruction of armies by the violent effects of its flame unconfined. This is the first well-authenticated hint, that was given in Europe of the application of gunpowder to warlike purposes; though the Germans attempt to trace back the invention of cannon as far as 1250, and ascribe it to Albertus Magnus, a Dominican monk.

That gunpowder, however, was both known and made use of long before the time, either of Roger Bacon, or Albertus Magnus, is a fact that cannot be denied. This is established beyond even the possibility of dispute by the treatise of Marcus Græcus, entitled "*Liber ignium*," which is in manuscript in the Royal library at Paris. Doctor Mead had this treatise also in manuscript, a copy of which is now in the possession of the ingenious and learned Dr. Hutton. The author of it describes several ways of encountering and opposing an enemy by launching fire on him, and among other things, gives the following directions. Mix together one pound of live sulphur, two of charcoal of willow, and six of salt-petre, reducing them to a very fine powder in a marble mortar; then put a certain quantity of this mixture into a long, narrow and well compacted cover, and then discharge it into the air. This is exactly the description of a rocket. He represents the cover, with which thunder is imitated as short, thick, but half-filled, and strongly bound with packthread, which is exactly the form of a cracker. He then delivers different methods for preparing the match, and explains how one squib may set fire to another in the air by having it inclosed within it. He describes two kinds of fire-works, one for flying, and the other for making a loud report. He directs the case, *tunica*, or cartouche for the first to be made long and slender, and the composition to be very closely rammed; and the case for the second to be thick and short, and only about half filled. His composition for both is stronger than a great deal of gunpowder that is made now. It must, indeed, be acknowledged, that he treats as expressly and distinctly of gunpowder and the effect of it, as any person writing on the subject, even at present possibly could do. He does not, however, speak of such compositions as used in war, which shews at least, that they were known before the use of any sort of fire-arms in those parts of the world, he was acquainted with. And as he does not pretend to be the inventor of these rockets and crackers, or mention them as things new or recent, it may reasonably be presumed, that they were in use long before his time, which is not ascertained to a certainty, though he must have lived as early at least as the eighth century. We have reason also to conclude from the authorities of many

authors, and a variety of concurrent and corroborating circumstances, that gunpowder or compositions resembling it, were known to the Chinese and Indian nations, even thousands of years ago. And it is also asserted by many modern travellers, that guns were made use of in China as far back as the year of Christ, 85, and that they have continued to be used there ever since. This assertion receives additional force and authority from the prohibition of fire-arms in the code of Gentoo laws, printed by the East India company in 1776. But there is reason to suppose that their fire-arms always were and have ever been in a very rude, imperfect, and inconvenient state compared to those that have been and are now used in Europe.

Though Bartholdus Schwartz has no claim whatever to the invention of gunpowder; it is alleged, and with great probability, that the simplest and most convenient method of applying it to military purposes in Europe, was first suggested to him, in 1320, by a spark of fire falling accidentally on a mixture of pounded nitre, sulphur, and charcoal, in a mortar imperfectly covered with a stone, which was thrown by the explosion to a considerable distance. The very figure and name of mortars given to a species of artillery, which are said to have been made-use of even before guns properly so called, and were employed at first for throwing large stones at considerable angles of elevation, render this conjecture probable.

Guns were soon after that incident employed in war. But mortars and great guns were first made use of.

Father Daniel in his life of Philip, of Valois, produces a proof from the records of the chamber of accounts at Paris, that cannon were used in the year 1338. And Du Cange finds mention made of them in Froissart, and other French historians some time earlier. In the list of aids raised for the redemption of John king of France, in 1368, mention is made of an officer in the French army under the denomination or appellation of *master of the king's cannon*, and of his providing four large cannons for the garrison of Harfleur. There was one in the arsenal of Bamberg as early as 1323. The French used them in 1338, for the attack of some castles. But they did not certainly employ them in the field against their fellow creatures near so early as the English, who under Edward III., placed five of them, in 1346, on a small hill near the village of Cressy, which chiefly contributed to decide the celebrated battle of that name. From this circumstance several of the French writers have laid claim to a greater degree of national humanity than they allow to the English. One of them, treating of cannon, expresses his sentiments on the subject in the following words. "On ne faisoit point encore usage en France, en 1547, de cette arme terrible contre les hommes; les Français s'en étoient bien servi, in 1338, pour l'attaque de quelques châteaux, mais ils rougissoient de l'employer contre leurs semblables. Les Anglais moins humains sans doute nous devancèrent et s'en servirent à la célèbre bataille de Creci, qui eut lieu entre les troupes du roi d'Angleterre Edouard III. qui fut si méchant, si perfide, qui donna tant de fil à retordre à Philippe de Valois, et aux troupes de ce dernier; et ce fut en majeure partie à la frayeur et à la confusion, qu'occasionnerent les canons dont les Anglais se servoient pour la première fois, et qu'ils avoient posés sur une colline, proche le village de Creci, que les Français durent leur déroute." The English also made use of them the year following, viz. in 1347, at the siege of Calais.

It is generally believed that cannon have been made use of in Europe ever since the year 1338, and that they were employed for naval purposes on the Baltic sea, in 1350. At any rate, it is certain that they were used by the Venetians, in

1366, at the siege of Claudia Jessa, now called Chioggia, and in their war with the Genoese in 1379 and 1380. Six years after this last-mentioned period the English carried cannon into England in two French vessels, which they had captured.

Larrey ascribes the invention of brass cannon to J. Owen. He asserts that there were none such known in England till the year 1535, and that iron-cannon were for the first time cast in it in 1547. The English, however, did not manufacture many of these till towards the end of the 16th century.

Specimens of great guns, as they were first used, and before the casting of them in founderies came into practice, are still to be seen in many parts of Europe, and some of them in the tower, and the warren at Woolwich. Such an instrument or engine of war was first called *bombarde*, afterwards *cannon*, and now commonly goes by the name of a piece of ordnance or artillery. The word cannon, however, is still applied to that part of every fire-arm great or small, that receives the powder.

Cannon were formerly made of a very great length, which rendered them exceedingly heavy, and the use of them very limited and troublesome. There were some of them employed by the Turks, in 1394, at the siege of Constantinople then in possession of the Christians, and also in 1452, which threw a weight of 100 lib.; but they could not stand repeated firing. Louis XII. had one cast at Tours of the same size, that threw a ball from the Bastile to Charenton. One of these extraordinary cannon was taken at the siege of Dien, in 1546, by Don John de Castro, and is now in the castle of St. Julian de Barra ten miles from Lisbon. The length of it is twenty feet seven inches; its diameter at the middle is six feet three inches; and it threw 100 lib. weight. It has neither dolphins, rings, nor a button; is of an unusual kind of metal, and has a large Indostan inscription on it, which says that it was cast in 1400.

Formerly strange and uncommon names were given to cannon. Thus Louis XII., in 1503, had twelve brass cannon cast of an extraordinary size called after the twelve peers of France. The Spaniards and Portuguese named theirs after their saints. The emperor Charles V., when he went against Tunis, had twelve cannon founded, which he called the Twelve Apostles. At Milan there is a seventy pounder called the Pimontelli; and there is one at Bois-le-duc called the Devil. At Dover castle there is a sixty pounder called Queen Elizabeth's pocket-pistol. There is an eighty pounder in the tower of London brought thither from Edinburgh castle called Mounts-meg. There is also an eighty pounder in the royal arsenal at Berlin called the Thunderer, and one of the same caliber at Malaga called the Terrible. There are two curious sixty pounders in the arsenal at Bremen called the Messengers of bad news. And lastly there is an uncommon seventy pounder in the castle of St. Angelo at Rome, made of the nails that fastened the copper plates which covered the ancient Pantheon, with this inscription on it. "Ex clavis trabalibus porticus Agrippæ."

About the beginning of the 15th century, these uncommon names were mostly laid aside, and the following among other more general ones adopted.

	Pounders.	Cwt.
Cannon royal or carthoun, - -	48 about	90
Bastard cannon or $\frac{3}{4}$ carthoun, -	36 - -	70
$\frac{1}{2}$ carthoun, - - - -	24 - -	60
Whole culverins, - - - -	18 - -	50
Demi-culverins, - - - -	9 - -	30
Falcon, - - - -	6 - -	25
Saker {	largest size, - - - -	8 - -
	ordinary, - - - -	6 - -
	lowest sort, - - - -	5 - -
		13

Basilisk,

CANNON.

	Pounders.	Cwt.
Basilisk, - - - - -	48	about 85
Serpentine, - - - - -	4	8
Aspic, - - - - -	2	7
Dragon, - - - - -	6	12
Syren, - - - - -	60	81
Falconer, - - - - -	3, 2, and 1.	15, 10, and 5.
Rabinet, - - - - -	1	
Moyene, - - - - -	10 or 12 ounces.	
&c.	&c.	

The French also had anciently the following pieces found-
ed, several of which are to be found in France at this day.

	Pounders.	lib.	Length.
			ft. in.
Basilic,	48	7200	10 0
Dragon,	40	7000	16 6
Flying Dragon,	32	7000	22 0
Le Serpentin,	24	4300	13 0
La Coulevrine,	20	7000	16 0
Le Paffemur,	16	4200	18 0
L'Aspic,	12	4250	11 0
Le Pefundeu,	8	3500	15 0
Le Pelican,	6	2400	9 0
La Demi coulevrine,	10	3850	13 0
Le Sacri,	5	2850	13 0
Le Sacret,	4	2500	12 0
Le Faucon,	3	2300	8 0
Le Fauconneau,	2	1350	10 6
Le Ribadequin,	1	700	8 0
Un autre Ribadequia,	$\frac{1}{2}$	450	6 0
L'Emerillon,	$\frac{1}{4}$	400 to 450	4 to 5

At present cannon take their names from the weights of the balls, which they respectively discharge. Thus a piece that discharges a ball of 24 pounds, is called a 24 pounder; one that takes a ball of 12 pounds, is called a 12 pounder; and so of the rest divided into the following sorts.

Ship-guns, consisting of 42, 36, 24, 18, 12, 9, 6, and 3 pounders.

Garrison guns, consisting of 42, 32, 24, 18, 12, 9, and 6 pounders.

Battering guns, consisting of 24, 18, and 12 pounders, and sometimes though but seldom of 42 pounders.

Field pieces consisting of 12, 9, 6, 3, 2, $1\frac{1}{2}$, 1, and $\frac{1}{2}$ pounders.

Table of ship-guns settled in 1753.

Brass ship-guns.			Iron ship-guns.		
Caliber.	Length.	Weight.	Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lb.		ft. in.	cwt. qr. lb.
42	9 6	61 2 10	42	10 0	55 1 10
32	9 5	55 2 7	32	9 6	53 3 23
24	9 5	51 1 12	24	9 5	48 0 0
18	9 0	48 1 0	18	9 0	41 1 8
12	9 0	29 0 0	12	9 0	32 3 3
9	8 5	26 0 0	9	8 5	23 2 2
6	8 0	19 0 0	6	7 0	17 1 14
3	6 5	11 0 0	4	6 0	12 2 13
			3	4 6	7 1 7

Table of Garrison Guns.

Brass garrison guns.			Iron garrison guns.		
Caliber.	Length.	Weight.	Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lib.		ft. in.	cwt. qr. lib.
42	10 0	64 0 0	32	9 8	56 0 0
32	9 2	49 2 18	24	9 8	48 0 0
24	8 4	37 0 0	18	9 0	36 0 0
18	7 6	27 3 0	12	7 8	24 0 0
12	6 7	18 2 0	9	7 0	18 0 0
9	6 0	13 3 0	6	6 1	12 0 0
5	5 3	9 1 0	4	5 4	8 0 0

Brass battering pieces.			Brass field pieces.		
New pieces.			New pieces.		
Caliber.	Length.	Weight.	Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lib.		ft. in.	cwt. qr. lib.
24	9 8	27 0 0	12	5 0	8 3 8
18	9 0	20 1 0	6	4 6	4 3 10
12	7 8	13 2 0	3	3 6	2 3 10

The following dimensions, &c. for all sorts of brass and iron cannon were established by the Board of Ordnance in 1764.

BRASS CANNON.

Nature.	Pounders.	Length.	Weight.	Caliber of the gun.	Diameter of the shot.
		ft. in.	cwt. qr. lib.	in. hund.	in. hund.
Heavy.	42	9 6	61 0 0	7.3	6.68
	24	9 6	52 0 0	5.83	5.54
	12	9 0	29 0 0	4.63	4.40
	9	9 0	26 0 0	4.21	4.0
	6	8 0	19 0 0	3.66	3.48
	3	7 0	11 2 0	2.91	2.77
	$1\frac{1}{2}$	6 0	5 2 0	2.31	2.2
	24	8 0	42 1 21	5.83	5.54
	12	6 6	21 0 14	4.63	4.40
	6	5 0	10 1 0	3.66	3.48
Medium. Light.	24	5 6	16 1 12	5.83	5.54
	12	5 0	8 3 18	4.63	4.40
	6	4 6	4 3 14	3.66	3.48
	3	3 6	2 3 4	2.91	2.77

CANNON.

IRON CANNON.

Nature.	Pou- ders.	Length. ft. in.	Weight. cwt. qr. lb.	Caliber of the gun. in. hund.	Diameter of the shot. in. hund.
Heavy.	42	9 6	65 0 0	7.3	6.68
	32	9 6	55 0 0	6.42	6 10
	24	9 6	49 0 0	5.83	5.54
	24	9 6	47 2 0	5.83	5.54
Light.	18	9 0	40 0 0	5.29	5.03
	12	9 0	32 2 0	4.63	4.40
	12	8 6	31 2 0	4.63	4.40
	12	7 6	29 1 0	4.63	4.40
Heavy. Medium. Light.	9	9 0	29 0 0	4.21	4.00
	9	8 0	27 2 0	4.21	4.00
	9	8 0	26 2 0	4.21	4.00
	9	7 6	24 2 0	4.21	4.00
	9	7 0	23 0 0	4.21	4.00
	6	9 0	24 0 0	3.66	3.48
	6	8 6	23 0 0	3.66	3.48
	6	8 0	22 0 0	3.66	3.48
	6	7 6	20 2 0	3.66	3.48
	6	7 0	19 0 0	3.66	3.48
	6	6 6	18 0 0	3.66	3.48
	4	6 0	12 1 0	3.21	3.04
	4	5 6	11 1 0	3.21	3.04
	3	4 6	7 1 0	2.91	2.77
	1 1/2	3 0	1 1 25	1.58	1.52

The following are the dimensions, &c. established by the Board of Ordnance in 1764 for brass howitzers, which may be regarded as a sort of short cannon, mounted like guns on travelling carriages, and were much later in coming into use than either guns or mortars.

BRASS HOWITZERS.

Nature.	Length.	Weight.	Caliber of the ho- witzer.	Diameter of the shell.	Chamber contains powder.
inches	ft. in.	cwt. qr. lb.	in. hund.	in. hund.	lib. oz.
8	3 1	11 0 0	8.0	7.75	3 8
5 8	2 2	4 0 14	5.62	5.50	1 0
4.5	1 10	2 0 14	4.52	4.40	0 8

Mortars are also a kind of short cannon of large bores, with chambers, and are made either of brass or iron. The following are the dimensions, &c. of all kinds of brass mortars, whether for land or sea service, as established by the Board of Ordnance in 1764.

BRASS MORTARS.

Natures.	Length.	Weight.	Caliber of the mortar.	Diameter of the shell.	Chamber contains powder.
inches	ft. in.	cwt. qr. lb.	in. hund.	in. hund.	lib. oz.
13 Sea	5 3	82 0 0	13.0	12.75	30 0
10 Sea	4 9	33 0 0	10.0	9.75	12 8
13 Land	3 8	25 0 0	13.0	12.75	10 0
10 Land	2 9	11 0 0	10.0	9.75	3 12
8 Land	2 2	4 0 0	8.0	7.75	2 0
5, 8 or royal.	1 4	1 1 0	5.62	5.50	0 9
4, 5 or coehorn	1 1 1/2	0 3 0	4.52	4.40	0 5

The

CANNON.

The following table shews, at one view, the lengths and weights of our brass cannon as they stand at present, with their respective calibers, or the diameters of their bores, the diameters of their shot, and of their shot gauges, the quantities of powder employed for proving them respectively, their respective charges for service, for saluting with them, and for scaling them.

BRASS GUNS OR CANNON.

Nature.	Length.	Weight.	Quantity of Powder used for				Calibers or Diameters of the Bores.	Diameters of the Shot.	Diameters of the Shot Gauges.	Number of Calibers in the length of each.	Number of Diameters of the Shot in the length of each.
			Proof.	Service.	Saluting.	Scaling.					
	ft. in.	cwt. qr. lb.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	inches	inches			
42 Pounder Heavy	9 6	66 0 0	31 8	14 0	10 8	3 4	7.018	6.684	6.795	16.244 or near 16 $\frac{1}{4}$	17.056 or near 17
32 Pounder Heavy	10 0	55 0 0	26 12	10 11	8 0	2 12	6.410	6.105	6.207	18.721 or near 18.7	19.656.
24 Pounder Heavy	9 6	53 0 9	21 0	8 0	6 0	2 0	5.824	5.547	5.639	19.574 or near 19.6	20.552
24 Pounder Medium	8 0	41 3 2	18 0	8 0	6 0	1 8	5.824	5.547	5.639	16.4835 or near 16 $\frac{1}{2}$	17.307 or near 17 $\frac{1}{2}$
24 Pounder Light	5 6	16 3 13	10 0	5 0	5 0	1 0	5.824	5.547	5.639	11.3324 or near 11 $\frac{1}{2}$	11.8983 or near 11.9
18 Pounder Heavy	9 6	45 1 20	18 0	6 0	4 8	1 8	5.292	5.040	5.124	21.542 or near 21 $\frac{1}{2}$	22.619 or near 22.6
12 Pounder Heavy	9 0	31 2 8	12 0	4 0	3 0	1 0	4.623	4.403	4.476	23.3614 or near 23 $\frac{1}{2}$	24.528 or near 24 $\frac{1}{2}$
12 Pounder General Defagulier } Defagulier	7 6	22 1 21	12 0	4 0	3 0	1 0	4.623	4.403	4.476	19.468 or near 19 $\frac{1}{2}$	20.4406 or near 20.44
12 Pounder Medium	6 6	21 3 0	9 0	3 8	3 0	0 12	4.623	4.403	4.476	16.872 12.9782	17.715 13.627
12 Pounder Light	5 0	8 3 4	6 0	3 0	3 0	0 8	4.623	4.403	4.476	or near 13	or near 13 $\frac{3}{4}$
6 Pounder Heavy	8 0	19 1 6	6 0	2 0	2 0	0 8	3.668	3.498	3.552	26.172 or near 26 $\frac{1}{6}$	27.444 or near 27 $\frac{4}{5}$
6 Pounder General Defagulier } Defagulier	7 0	12 0 24	6 0	2 0	2 0	0 8	3.668	3.498	3.552	22.901 or near 22 $\frac{9}{10}$	24.0137 or near 24
6 Pounder Medium	5 0	10 0 20	6 0	2 0	2 0	0 8	3.668	3.498	3.552	16.3577 or near 16 $\frac{3}{4}$	16.7623 or near 16 $\frac{3}{4}$
6 Pounder Light	4 6	5 0 18	3 0	1 8	1 8	0 4	3.668	3.498	3.552	14.722 or near 14 $\frac{3}{4}$	15.4374 or near 15 $\frac{3}{4}$
3 Pounder Heavy	7 0	11 3 19	3 0	1 0	1 0	0 4	2.913	2.775	2.820	28.836	30.2702 or near 30 $\frac{1}{4}$
3 Pounder General Defagulier } Defagulier	6 0	6 0 0	3 0	1 0	1 0	0 4	2.913	2.775	2.820	24.717	25.946 or near 26
3 Pounder Light	3 0	1 3 16	1 8	0 8	0 8	0 2	2.913	2.775	2.820	12.3584 or near 12 $\frac{1}{2}$	12.973 or near 13
1 Pounder Heavy	5 0	2 2 12	1 0	0 6	0 6	0 1 $\frac{1}{2}$	2.019	1.923	1.955	29.7181	31.2011 or near 31 $\frac{1}{5}$

CANNON.

The following is a similar table, for iron guns and carronades.

IRON GUNS and CARRONADES.

Nature.	Length.	Weight.	Powder for						Calibers or Diameters of the Bore.	Diameter of the Shot.	Diameters of the Shot Gauges.	Number of the Calibers in the length of each Gun or Carronade.	Number of the Diameters of the Shot in the length of each Gun or Carronade.
			Proof.	Service.	Saluting.	Scaling.							
68 Pounder Carronades	5 2	36 0 0	13 0	6 0	6 0	2 0	8.05	8.00	inches	7.7018	7.75		
42 Pounder Gun	10 0	67 0 0	25 0	14 0	10 8	3 4	7.018	6.684	6.795	17.099	17.9533		
42 Pounder Carronades	4 3 $\frac{1}{8}$	22 1 0	9 0	4 8	4 8	1 8	6.85	6.684	6.795	or near 17	or near 18		
32 Pounder Gun	10 0	58 0 0	21 8	10 11	8 0	2 12	6.410	6.105	6.207	7.5182	7.7049		
32 Pounder Carronade	4 0 $\frac{1}{4}$	17 0 14	8 0	4 0	4 0	1 4	6.25	6.105	6.207	18.721	19.656		
24 Pounder Gun	10 0	52 0 0	18 0	8 0	6 0	2 0	5.824	5.547	5.639	7.72	7.9033		
24 Pounder Carronade	3 7 $\frac{1}{2}$	13 0 0	6 0	3 0	3 0	1 0	5.67	5.547	5.639	20.604	21.6338		
18 Pounder Gun	9 6	42 0 0	15 0	6 0	4 8	1 8	5.292	5.040	5.124	7.672	7.842		
										21.542	22.619		
										or near 22.6			
18 Pounder Carronade	3 3	9 0 0	4 0	2 0	2 0	1 0	5.14	5.040	5.124	7.587	7.738		
12 Pounder Gun	9 6	34 0 0	12 0	4 0	3 0	1 0	4.623	4.403	4.476	24.6593	25.8914		
12 Pounder Carronade	2 2	5 3 10	3 0	1 8	1 8	0 12	4.50	4.403	4.476	5.7777	5.905		
9 Pounder Gun	9 6	30 1 0	9 0	3 0	2 4	0 12	4.200	4.000	4.066	27.095	28.5		
										or near 27	or 28 $\frac{1}{2}$		
6 Pounder Gun	9 0	24 0 0	6 0	2 0	2 0	0 8	3.668	3.498	3.552	29.444	30.875		
										or 29 $\frac{2}{3}$			
4 Pounder Gun	6 0	12 1 0	4 0	1 5	1 5	0 6	3.204	3.053	3.104	22.47	23.583		
3 Pounder Gun	4 6	7 1 0	3 0	1 6	1 0	0 4	2.913	2.775	2.820	18.5376	19.459		
2 Pounder Gun	3 9	4 2 0	2 0	0 11	0 11	0 3	2.544	2.423	2.463	17.69	18.57		
1 Pounder Gun	3 0	2 2 0	1 0	0 6	0 6	0 1 $\frac{1}{2}$	2.019	1.923	1.955	17.8	18.7		
$\frac{1}{2}$ Pounder Gun	3 0	1 2 0	0 8	0 3	0 3	0 1	1.602	1.526	1.551	22.471	23.59.		

The following is a similar table for the lengths, weights, &c. of brass mortars, which are pieces of artillery, and may be regarded as a species of short cannon, used by us at present.

BRASS MORTARS.

Nature.	Length.	Weight.	Powder for Proof.	Shells contain Powder.	Weight of Shells empty.	Medium range at an Elevation of 45°.	Chambers contain Powder.	Powder for bursting Shells.	Powder for Scaling.
	ft. in.	cwt. qr. lb.	lb. oz.	lb. oz.	lb.	yards.	lb. oz. gr.	lb. oz. gr.	lb. oz. gr.
13 Inches Sea Service	5 3	82 0 0	30 0	10 4	197	4100	32 0 0	6 12 0	1 4 0
13 Inches Land Service	3 8	25 0 11	9 8	10 4	197	2100	9 1 8	6 12 0	0 8 0
10 Inches Sea Service	4 8	33 0 0	12 8	4 5	93	3800	12 8 0	2 14 0	0 14 0
10 Inches Land Service	2 9	10 2 0	3 14	4 5	93	1900	4 0 0	2 14 0	0 4 0
8 Inches Land Service	2 2	4 1 0	2 0	2 12	45 $\frac{1}{2}$	1700	2 0 10	1 14 0	0 3 0
5.6 Inches Land Service	1 4	1 1 8	0 9	1 0	15	1200	1 0 10	0 11 0	0 2 0
4.5 Inches Land Service	1 1 $\frac{1}{2}$	0 3 8	0 4 $\frac{1}{2}$	0 7	8	1000	0 8 0	0 5 0	0 1 $\frac{1}{2}$ 0

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The following is a similar table for the lengths, weights, &c. of iron mortars used by us at present.

IRON MORTARS.

Nature.	Length.	Weight.	Powder for			Ranges at an Elevation of 45°.
			Proof.	Burting Shells.	Scaling.	
	ft. in.	cwt. qr. lb.	lb. oz.	b. oz.	lb. oz.	yards
13 Inches	4 4	30 0 0	8 8	6 12	10 4	8 1800
10 Inches		0 0 0	3 4	2 14	4 5	0 4 1600

The following is a similar table for howitzers, as we now use them.

BRASS HOWITZERS.

Nature.	Length.	Weight.	Powder for			Ranges at an Elevation of 45°.
			Proving.	Scaling.	Burting Shells.	
	ft. in.	cwt. qr. lb.	lb. oz.	lb. oz.	lb. oz.	yards
10 Inches	3 11 1/2	25 3 0	7 0 0	10 2 14	93	3000
8 Inches	3 1	12 3 0	3 8 0	8 1 14	45 1/2	2000
5.6 Inches	2 2 1/2	4 0 4	1 0 0	4 0 11	15	1400
4.5 Inches	1 10	2 1 8	0 8 0	2 0 5	8	1200

The names of the several parts of a cannon are the following. See *Plate I. Cannon, fig. 1.*

A B is the whole length of the gun, which is reckoned from the hind part of the base ring, or the beginning of the cascable, to the extremity of the muzzle or mouth of the piece: and the grand exterior divisions are these that follow.

A E. The first reinforce, or that part of the gun which is next to the breech, and is made stronger than the other parts to resist the force of the powder. It includes the base ring, the ogee next to it, the vent-field, the vent-afragal, and the first reinforce-ring. E F. The second reinforce. It begins where the first reinforce ends, and is made somewhat smaller than the first. It includes the ogee next to the first reinforce ring, the trunnions, and the second reinforce ring. F B. The chace, beginning where the second reinforce ends, and extending from thence quite to the muzzle. It includes the ogee next to the second reinforce ring, the chace-girdle and afragal, and the muzzle and afragal. H B. The muzzle, properly so called, reaches from the beginning of the muzzle afragal to the mouth of the piece. But the word muzzle is also sometimes made use of to express the mouth of the gun.

The smaller exterior divisions of a cannon are the following:

Ab. The cascable, the hindmost part of the breech of the gun, extending from the base ring to the extremity of the knob or button. b. The cascable-afragal, which is the

part that diminishes between the two breech-mouldings. c. The neck of the cascable, which is the narrow, rounding, diminishing part of the metal between the breech-moulding and the button. A C. The breech. The solid piece of metal or part of the gun from the vent to the extremity of the base-ring, terminating where the cascable begins. A i. The breech-mouldings. They are those eminent or prominent rounding parts between the base ring and the neck of the cascable, and serve only as ornaments to the piece. r s. The base-ring and ogee, or resistance. These are ornamental mouldings, the latter of which is always somewhat in the shape of S. is taken from civil architecture, and made use of in guns, mortars, and howitzers. C D. The vent-field. It is the part that extends from the vent to the first reinforce-afragal. t. The vent-afragal and fillets, or the mouldings and fillets at or near the vent. u. The charging cylinder, which is all the space or length from the chace afragal to the muzzle-afragal. p q. The first reinforce-ring and ogee, which is the ornament on the second reinforce. f. The first reinforce-afragal, which is the ornament between the first and second reinforce. F I. The chace-girdle, which is the ornament close to the trunnions. T. The trunnions, which are two solid cylindrical pieces of metal, in every gun, which project from the same, and support it on its carriage. G. The dolphins, which are two handles placed on the second reinforce-ring of brass guns, which resemble the fish of that name. They are useful for mounting and dismounting the guns with. V W. The second reinforce ring and ogee are the two ornaments joining the trunnions. V. The second reinforce-afragal, which is the moulding nearest the trunnions. X. The chace-afragal and fillets are the two last mentioned ornaments taken jointly. Z. The muzzle-afragal and fillets are the joint ornaments nearest to the muzzle. m. The swelling of the muzzle or projecting part behind the muzzle mouldings. n. The muzzle-mouldings, which are the ornaments at the very muzzle or mouth of the piece.

The interior parts of a cannon are the following:

o. The bore, is the interior cavity which receives the powder and shot. a. The mouth, is the entrance of the bore. d. The vent, which in all kinds of fire-arms is commonly or vulgarly called the touch-hole. It is a small hole, pierced at or near the end of the bore or chamber for priming the piece with powder, or for introducing the tube, in order, when lighted, to set fire to the charge. e. The chamber, which is used only in guns of large calibers, is the place where the powder forming the charge is lodged.

The following are tools for loading and firing cannon.

Coins, or wedges, which are laid under the breech of a gun, for the purpose of either elevating or depressing it.

Handspikes, for moving and laying it with.

Ladles, for loading the gun with loose powder.

Rammers, which are cylinders of wood, of the same diameters and axes with the shot. They serve for ramming home the wads put upon the powder and shot.

The sponge, which is fixed at the opposite end of the rammer, covered with lambskin. It serves for cleaning out the gun when fired.

Screws, which are used with field-pieces, instead of coins or wedges. The screw serves not only for elevating or depressing the gun, but for keeping it at the same angle of elevation or depression.

The tools necessary for proving cannon are the searcher with a reliever, and the searcher with one point.

The searcher is an iron, hollow at one end to receive a wooden handle, and on the other end has from four to eight flat

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flat springs, of about eight or ten inches long pointed and turned outwards at the ends.

The reliever is an iron flat ring, with a wooden handle at right angles to it. When a gun is to be searched, after it has been fired, this searcher is introduced, and turned every way from end to end; and if there is any hole the point of one or other of the springs gets into it, and remains till the reliever, passing round the handle of the searcher, and pressing the springs together, relieves it.

When there is any hole or roughness in the gun, the distance from the mouth is marked on the outside with chalk.

The other searcher has also a wooden handle, and a point at the fore end, of about an inch long, at right angles to the length. About this point is put some wax mixed with talow, which when introduced into the hole or cavity is pressed in, when the impression on the wax gives the depth; and the length is known by the motion of the searcher backwards and forwards. If a hole is one-ninth of an inch deep, the gun is rejected.

CANNON, Construction of. Most nations in a great measure agree in the form and general divisions of a cannon, with the exception that the French place the trunnions half a caliber farther back, or nearer to the breech than others.

As the lengths fixed on by general Armstrong, formerly surveyor general of the ordnance, as best for some guns, in consequence of experiments made by him, are still retained by us, it may not be improper to give his general construction both for brass and iron cannon, which is as follows.

The whole length of the gun being divided into seven equal parts, take the length of the first reinforce, A E, equal to two of these parts, and that of the second reinforce, E F, equal to one of these parts, together with one diameter of the bore, leaving the length of the chase equal to four of these parts, wanting one diameter of the bore.

The thickness of the breech, A C, or the distance from the hind part of the base ring to the beginning of the bore, is always equal to the thickness of the metal at the vent. The trunnions, T, are always one caliber or diameter of the bore in length clear of the second reinforce ring, and as much in diameter; and they are placed in such a manner, that a right line drawn through their centres touches the lower part of the bore, as in *fig. 4.* where that line is marked *ab*. The length of the cascable, A b, is always equal to two calibers or diameters of the bore and a quarter.

The following are the general dimensions of brass guns, according to this construction.

Supposing the caliber of the gun to be divided into 16 equal parts,

	Inches.
The thickness of the metal, from the hind part of the base ring to the bore, or thickness of the breech will be	16
The thickness of the metal at the end of the first reinforce ring will be	14.5
Thickness of the metal at the same place, or at the beginning of the second reinforce	13.5
Thickness of the metal at the end of the second reinforce	12.5
Thickness of do. at the same place, or the beginning of the chase	11.5
Thickness of do. at the end of the chase or muzzle, exclusive of the mouldings	8
<i>Mouldings.</i>	
Breadth of the base ring	1.5
Breadth of the ogee next to the base ring	2.0

Distance from the ogee to the fore part of the astragal one calibre

Breadth of each of the fillets of the astragal	0.28
Breadth of the astragal, or half round	0.56
Total breadth of the astragal and fillets	1.12
Breadth of each of the fillets at the first and second reinforce ring	0.25
Breadth of the first and of the second reinforce rings	1.25
Breadth of the ogees, next to these rings	1.5
Breadth of the fillets at the muzzle	0.25

The muzzle ogee in a 12 pounder, and guns of higher calibers is equal to 1.25 inches or $1\frac{1}{4}$ inch. But in a 9 pounder, and guns of smaller calibers, it is only equal to one inch. The chace-girdle and astragal are equal to one caliber.

The distance from the mouth of the gun to the muzzle astragal is equal to a diameter of the second reinforce ring, in 18 pounders and guns of higher calibers; but in a 12 pounder, and guns of smaller calibers, it is equal to the diameter of the first reinforce ring.

The rising or swelling of the mouldings at the first and second reinforces is about an eighth part of an inch; and the rising of the base-ring is determined by laying a ruler to the extremities of the first and second reinforce mouldings.

The diameter of the gun, through the swelling of the metal at the muzzle, is always equal to the diameter of the second reinforce ring.

Parts of the Cascable.

From the hind part of the base ring to the fore part of the fillet next to the button, the distance is equal to three-fourth parts of a caliber. The distance from the fore part of the fillet next to the button to the centre of the button is equal to one caliber. The distance from the hind part of the base ring to the hind part of the fillet, between the two ogees, is a sixth part of the caliber. The diameter of the fillet next to the button is equal to one caliber and a half. The diameter of the neck of the cascable is equal to three fourth parts of a caliber. The diameter of the button is somewhat more than one caliber.

It is proper to observe, that the shell at the vent is three inches broad, and reaches from the base ring to within a quarter of an inch of the vent-astragal, leaving that space for the ease of turning. And the vent is the fifth part of an inch.

General dimension, according to this construction, for iron guns.

Supposing the calibre of the gun to be divided into 14 equal parts, we shall have,

	Parts.
The thickness of the metal at the vent from the bore	16
The thickness of do. at the end of the first reinforce, equal to	14.5
The thickness of do. at the beginning of the second reinforce equal to	13.5
The thickness of do. at the end of the second reinforce equal to	12.5
The thickness of do. at the beginning of the chase equal to	11.5
The thickness of do. at the end of the chase or muzzle, equal to	8

The mouldings, and the rest of the dimensions, are nearly the same as in the brass guns. The diameter of the vent, however, in his iron guns, is one-fourth part of an inch, whereas it is only a fifth part of an inch in his brass cannon.

The length of brass guns, according to him (general Armstrong), are the following:

The

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The 32 pounder	10 0
The 24 pounder	9 5
The 18 pounder	9 5
The 12 pounder	9 0
The 6 pounder	8 0
The 3 pounder	7 0
The 1½ pounder	6 0

And, according to him, the length of the iron

32 pounder was	9 5
Of the 24 pounder	- 9 0
Of the 18 pounder	- 9 0
Of the 12 pounder	- 8 0
Of the 9 pounder	- 7 0
Of the 6 pounder	- 6 6
And of the 3 pounder	- 4 6

General Armstrong, in order to ascertain the fittest and best lengths for battering pieces, made experiments in 1736 with brass 24 pounders of different lengths, but of nearly the same weight. After a great number of trials and experiments with them, he fixed on nine feet six inches as the best length for a 24 pounder battering piece, though some of the ranges with one only nine feet long, with the same charge of two-thirds of the weight of the ball, and with the same elevation, were somewhat greater than the greatest of those with one nine feet six inches long.

In the following table are the lengths of the 24 pounders with which he made a multiplicity of experiments, and three of the longest ranges of each, loaded with sixteen pounds of powder.

BRASS 24 POUNDERS.

Length.	Ranges in Yards.	Ranges in Yards.	Ranges in Yards.
10 6	2488	2614	2406
10 0	2570	2532	2436
9 6	2633	2560	2500
9 0	2796	2494	2563
8 6	2586	2490	2466
8 0	2438	2470	2453

Now it is obvious that if we even suppose all these pieces to have been bored exactly alike, and their vents to have been placed also exactly alike, with regard to the bottoms of their bores, these experiments are not calculated for determining precisely the best length of a 24 pounder, either for battering in breach, or for any other service. For these suppositions relative to their respective bores and vents being even granted, no other inference can be drawn from them than this, that nine feet six inches is about the best length for a 24 pounder, that is to be used with a charge of 16 pounds of powder. But a charge equal to two-thirds of the whole weight of the ball is preposterously large for any kind of service whatsoever. It does not follow from them that nine feet six inches would have been found the best for a 24 pounder, had the charge he made use of been one-half, one-third, one-fourth, or even one-fifth part of the weight of the ball, the last of which, if the windage be very small, is sufficient even for battering with.

If a specific charge of powder be fixed on as the fittest for a gun of a given caliber for a given service, the best way to ascertain the proper length of such a gun, it appears, would be to have one of that caliber cast longer than what is necessary, and then to cut it shorter and shorter, by a few inches at a time, firing it always at the same elevation with the

given charge. But even this experiment would only determine its fittest length for that particular service, with the said assumed charge of powder. There ought to be guns of very different lengths, even of the same caliber, for different kinds of service. For no one length for a gun of a given caliber will render it fittest for various species of service.

Though the velocity increases with the length of the gun, yet it increases in a much smaller ratio, the velocities being in ratios somewhat less than the ratios of the square roots of the lengths of the bore, and somewhat greater than the ratios of the cube roots of the said lengths, or nearly in middle ratios between the two. And as the range increases in a much less ratio than the velocity, being nearly as the square root of the same, when the gun and elevation are the same, or nearly, as the fifth root of the length of the bore, it is evident that the range is very little increased by a great increase in the length of the bore. The increase, indeed, is so small, that doubling the length of the gun does not augment the range more than about a seventh part.

As the easy and expeditious movement and conveyance of artillery from place to place are of the first importance on actual service, and tend greatly to expedite and accelerate operations of an army in the field, it is a consideration of the utmost consequence to have field-pieces as light as possible, both by shortening the lengths of their bores, and lessening their thickness of metal. A proper diminution of the windage would make the range of a short gun as great as that of one of double the length with the customary windage.

The following is a table of the results of very useful experiments made at Mahon in Minorca in 1745 by general Williamson, and other officers of artillery, with two iron 18 pounders, one of which was 11 feet long, and weighed 51 cwt. 0 qr. 5 lb. and the other 9 feet long, weighing 39 cwt. 1 qr. 3 lb. The object of these experiments was partly to determine which of these lengths was fittest for an 18 pounder, and partly to ascertain what charge of powder would give the greatest ranges with them.

11 Feet.				9 Feet.			
Length.	Number.	Elevation.	Powder.	Length.	Number.	Elevation.	Powder.
11	1	1760	11 lb.	9	1	3016	10 lb.
11	2	1750	12 lb.	9	2	2720	11 lb.
11	3	1725	13 lb.	9	3	2800	12 lb.
11	4	1725	14 lb.	9	4	3000	13 lb.
11	5	2000	15 lb.	9	5	2712	14 lb.
11	6	1830	16 lb.	9	6	2910	15 lb.
11	7	1965	17 lb.	9	7	2955	16 lb.
11	8	2018	18 lb.	9	8	3070	17 lb.
11	9	1800	19 lb.	9	9	3185	18 lb.
11	10	1935	20 lb.	9	10	3095	19 lb.
11	11	1960	21 lb.	9	11	3420	20 lb.
11	12	2048	22 lb.	9	12	3185	21 lb.
11	13	2060	23 lb.	9	13	3532	22 lb.
11	14	2165	24 lb.	9	14	2940	23 lb.
11	15	2050	25 lb.	9	15	3460	24 lb.
11	16	2272	26 lb.	9	16	3725	25 lb.
11	17	2490	27 lb.	9	17	2550	26 lb.
11	18	2395	28 lb.	9	18	2377	27 lb.
11	19	2567	29 lb.	9	19	2305	28 lb.
11	20	2670	30 lb.	9	20	2575	29 lb.
11	21	2910	31 lb.	9	21	2495	30 lb.
11	22	2780	32 lb.				
11	23	2790	33 lb.				
11	24	2577	34 lb.				

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It appears from these experiments, that when those eighteen pounders were charged with nine pounds of powder, their ranges were generally somewhat greater at the same elevation than they were when loaded with either more or less; and that those of the eighteen pounder, nine feet long, exceeded those of the other, eleven feet long, with the same charge of half the weight of the ball.

They have every appearance of having been made with attention and accuracy. But as they were all made with a charge of powder by far too great for any kind of service with an eighteen pounder, no just conclusion can be drawn from them with regard to the best length for a gun of that caliber. Besides, as there were only two lengths made use of, the only inference any one can be justified in deriving from them is this, that nine feet is a better length than eleven feet for an eighteen pounder, when fired with nine pounds of power. They have no tendency whatsoever to determine what length is fittest for a cannon of that caliber, when fired with six, or four, &c. pounds of powder.

Mr. Muller, however, regarded them as perfectly conclusive on this head, from finding that 4160 yards, the greatest range of the piece, nine feet long, at an elevation of 45 degrees, with nine pounds of powder, differed only thirty yards from 4190 yards, the greatest possible range of a gun of that caliber, according to an erroneous theory of his, founded on a misconception of sir Isaac Newton's meaning, in the second book of his Principia, and expresses himself exultingly in the following words. "Thus we have at last determined that important question in artillery sought for ever since its invention."

This gentleman, after asserting that the greatest velocity which a leaden bullet of three quarters of an inch diameter can possibly have is that which, uniformly continued, would carry it through 395 feet per second, animadverts on Mr. Robins's method of determining the velocities of shot in the following words.

"Mr. Robins thinks to prove, in his seventh problem, that the velocity of the foregoing leaden bullet is 1668 feet in a second, which is more than four times greater than that above; and, what is more extraordinary, he pretends to have found the same velocity by experiments. As he seems to build his theory upon sir Isaac Newton's principles, had he read the 40th proposition, book second, of his Principia, he must have been convinced of his mistake."

This is a heavy charge, and were it well founded, would, in a great measure, invalidate all that Mr. Robins has advanced, in regard to the determination of the first velocities of shot, as this is the only example that Mr. Robins calculates in his seventh proposition from his theory of the elastic force of the fluid generated by the firing of gunpowder, which he compares, in his ninth proposition, with the velocity ascertained by means of his ballistic pendulum, and finds to be almost the same. This is the place that Mr. Muller refers to, when he speaks of Mr. Robins as pretending to have found the same velocity by experiments. It is, moreover, deserving of observation, that Mr. Robins does not speak of this velocity as the greatest that can possibly be communicated to such a ball. For a much greater one undoubtedly may be so communicated. And it cannot with justice be alleged that Mr. Robins built this part at least of his theory on sir Isaac Newton's principles, as his method of determining the first velocities of bullets is entirely his own. The mistake lies not with Mr. Robins, but with Mr. Muller himself, who could not, when he made the animadversion, have read with proper attention the said 40th proposition of the second book of the Principia, which relates entirely to the descent of bodies in an infinitely compressed and perfectly fluid medium; where-

as Mr. Robins's calculation just mentioned refers expressly to projectile motion: and that projectile velocity may be much greater than the greatest velocity, by which a body can descend by its comparative weight in such a fluid, is what no person, who has considered the subject with the least attention, will offer to deny. Even Galileo himself, who was the first that studied with any care the motions of projectiles and the nature of resisting mediums, seems to have been sufficiently sensible of this truth. For, in his fourth dialogue, after observing that the heaviest bodies would in time, by descending in the air, acquire a degree of velocity which could not afterwards be increased in the same manner as we see light bodies soon arrive at their greatest velocity possible, he says, "This determinate and ultimate velocity may be called the greatest which such a heavy body can naturally obtain in the air. But this velocity I imagine to be much less than that which is given to the same ball flung by fired powder." And he proposes to prove this, by first firing a musket loaded with a leaden ball and a proper charge of powder from a hundred yards high or more against a stone pavement, and then firing the same with a like charge against a stone of the same sort at a few yards distance, and examining which of the balls was most flatted. Every body now knows that this imagination of his was perfectly just.

Sir Isaac Newton begins the said proposition in his second book with a rule for determining the greatest velocity, with which a globe can descend in an infinitely compressed and completely fluid medium. His words are the following: "Sit A pondus globi in vacuo, B pondus ejus in medio resistente, D diameter globi, F spatium, quod sit $\frac{4}{3} \times D$ ut densitas globi ad densitatem medii, id est, ut A ad A-B; G tempus quo globus pondere B sine resistentia cadendo describit spatium F; et H velocitas, quam globus hocce casu suo acquirit. Et erit H velocitas maxima, quacum globus pondere suo B in medio resistente potest descendere." This, however, is the very rule, as is found by calculation, that Mr. Muller made use of for determining the greatest possible projectile velocity of a bullet of three quarters of an inch diameter, as well as those of larger ones. It is not, therefore, to be wondered at, that he has given a very erroneous table of the greatest possible velocities of shot of different diameters, from three pounds up to forty-eight, and of their greatest ranges.

As twenty-one diameters of an eighteen pounder shot are nearly equal to nine feet, and as nine pounds of powder were a charge equal in weight to half that of the shot, Mr. Muller concluded that guns of all calibers having their lengths and charges respectively proportional to these, would give greater ranges than guns of the same calibers with any other lengths and charges, greater or less, would give, supposing, without sufficient reason for doing so, the greatest velocities to be always proportional to the diameters of the shot.

He accordingly, in his constructions for guns, makes both battering and garrison cannon from eighteen to twenty-one diameters of their shot long respectively.

He allows, however, that though it is of advantage to know the best length and charge for every piece, the lengths of guns must depend on the services they are intended for. He observes, that ship-guns should, for various reasons, be short and light; that field-pieces, or battalion-guns, should also be short and light, in order to be able to advance or retire as fast as the army; that battering pieces should be long enough to prevent the flame of the powder, when they are repeatedly fired, from damaging much, or destroying very suddenly the sides of the embrasures; and that garrison guns ought to be of the lengths that give the greatest ranges,

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ranges, to oblige the besiegers to break ground at the greater distance, and to reach shipping, &c. from forts near the sea, or navigable rivers, as far off from them as possible.

In his general construction of brass cannon for the land service, he supposes the length of the gun to be twenty-one diameters of the shot from a twenty-four pounder inclusive, downwards, giving, however, the same length to the thirty-two pounder and to the forty-two pounder that he gives to the twenty-four pounder, making thereby the diameter of the first of these about nineteen diameters of its shot, and that of the last about seventeen diameters of its shot and one third.

The Construction is this.

Let the length AB of the piece (see *fig. 1.*) be twenty-one diameters of its shot; and let the diameter of the shot be divided into twenty-four equal parts, from which all the rest of the dimensions are to be determined. Make the

Diameter of the bore equal to - 25 such parts.

The distance from A, the hind part of the base-ring, to D, the fore part of the vent-afragal - 40 such parts.

The thickness of the metal at the breech and vent - 18.5 such parts.

The thickness of the metal at the mouth 9 such parts.

Then the lines drawn from these points will determine the figure of the gun, which will be therefore from A to D cylindrical, and from thence to the mouth conical.

The centre line of the trunnions crosses the centre line of the bore at right angles, and at the distance of three sevenths of the whole length AB of the gun, from the hind part A of the breech; the diameter of each of them is equal to eighteen such parts, and its length is equal to its diameter, exclusive of the projection of the second reinforce ring. The length EF of the second reinforce is always equal to two-thirds of AE, the length of the first reinforce. The breech AC, is equal to sixteen such parts; and the chace-girdle is equal to fourteen. The muzzle HB is equal to a tenth part of the whole length of the gun, which is here equal to 50.4 such parts.

The breadth of the base-ring and ogee next to it are each of them equal to - 6 such parts.

The first and second reinforce rings, and the ogee next to them, are each of them equal to - 5 such parts.

Each afragal and fillets are equal to - 4 such parts.

The cavetto at the mouth is equal to - 2.5 such parts.

And the fillets are each equal to - 1 of such parts.

The base-ring projects the metal two such parts, the first and second reinforce rings, about one such part; the fillets of the afragals, the half of one of such parts; and the round of each afragal is described from a centre in the outline of the piece.

There is a circular shoulder about each of the trunnions, of which the diameter exceeds that of either of the trunnions by six such parts, and projects so as to be even with the second reinforce-ring.

As to the cascable (see *fig. 2.*) the distance from A, the hind part of the base-ring, to C, the centre of the button, is equal to twenty-seven such parts; the radius of the button to nine; the breadth of the quarter round to two; the ogee to five, and the fillets each to one. If from C, the centre of the button, right lines be drawn to the extremities EF of the base-ring, and points O, O be found in these lines equally distant from the button and the second fillet, arcs described from these points with that distance will determine the

neck, whilst right lines OP parallel to CA, the direction of the axis of the piece, will fix the extremes, or limit the hind part of the second fillet, and CF determines the first.

In order to describe the ogee, join the extremities *n, q* of the hind parts of the fillets; through the point *q*, draw the indefinite right line, *qpL*, parallel to *On* produced; bisect the right line *nq* in the point *s*, and through the point of bisection *s* draw a right line making angles with *nq* equal each to the angle *s q L*, and meeting *q L* and *On* produced in the points, *p, P*, respectively. Then arcs described from the points *P, p*, as centres, with a radius equal to *Pn, Ps*, or *ps*, will determine the ogee *nsq*. The quarter round is determined by so describing an arc from a point *r* in *p q* produced, that it shall meet the hind part of the base-ring within one of such parts, as the diameter of the shot contains twenty-four. The breadth of the shell is equal to six such parts, and the diameter of the vent is a fifth part of an inch.

As to the muzzle (see *fig. 3.*) take the right line BK, equal to twenty such parts, BP equal to six such parts, and draw PL equal to BP, and at right angles to BK. From the point K draw also a right line perpendicular to BK. Then if the right line joining the points B, L be produced to meet this last-mentioned perpendicular in the point I, an arc described from this point as a centre, with the radius IL or IK, will determine the cavetto, or concave quarter, round LK. And if through the point *a*, at the distance of four such parts from B H, and parallel to the same, the right line *ar* be drawn, in it take a point *r* at equal distances from the point L, and the extremity of the hind part of the fillet for describing from as a centre, the quarter round, with this distance as radius.

From this construction, with twenty-one diameters of the shot, for the lengths of brass guns respectively for land service, from a 24 pounder inclusive downwards; and with 14 diameters of the shot for lengths of iron field pieces respectively, he has given us tables of the weights and dimensions of each, which are the following.

Table of the weight and dimensions of brass guns for land-service.

Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lb.
6 pounder	6 1	8 0 4
9 pounder	7 0	12 0 6
12 pounder	7 8	16 0 8
18 pounder	9 0	24 0 12
24 pounder	9 8	32 0 16
32 pounder	9 8	42 0 20
42 pounder	9 8	52 0 24

Table of the weight and dimensions of iron field-pieces.

Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lb.
3 pounder	3 3	2 1 0
6 pounder	4 1	4 2 0
9 pounder	4 8	6 3 0
12 pounder	5 1	9 0 0
18 pounder	5 10	13 2 0
24 pounder	6 5	18 2 0

He gives another general construction for brass battering pieces on the supposition that the length, AB (see *fig. 1.*) of each is only equal to eighteen diameters of its shot, with all the other parts of the construction remaining the same as above.

From this construction he gives another table for brass battering pieces, and compares them with the old, as follows.

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Lengths and weights of brads battering pieces.

Old Pieces.			New Pieces.		
Caliber.	Length.	Weight.	Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lb.		ft. in.	cwt. qr. lb.
6 pounder	8 0	19 0 0	12 pounder	6 7	13 2 0
9 pounder	9 0	25 0 0	18 pounder	7 6	20 1 0
12 pounder	9 0	29 0 0	24 pounder	8 4	27 0 0
18 pounder	9 0	48 0 0	32 pounder	9 2	36 0 0
24 pounder	9 6	51 0 0	36 pounder	9 6	40 2 0
32 pounder	10 0	55 0 7	42 pounder	10 0	47 1 0
42 pounder	9 6	61 2 10	48 pounder	10 6	54 0 0

These constructions are on the supposition that the guns are cylindric as far as the charges reach, and from thence conical to the mouth. The centre line of the trunnions is also supposed to intersect the longitudinal axis of the bore of each gun at right angles, to prevent it, when fired, from injuring or destroying its carriage, which it will soon do if the said line be lower.

The quantity and weight of metal in a gun by this construction he determines in the following manner.

Take the diameter of the gun across the centre of the bore at the muzzle without the mouldings, which is equal to forty-three such parts as the twenty-four, into which the diameter of the shot is supposed to be divided, and the square of it is

1849

To this he adds the square of sixty-one, the number of such parts in the diameter of the gun at the vent-afragal

3721

To these he adds the rectangle under these two diameters or 43×61

2623

The sum of these three products is

8193

The third part of this sum is

2731

Which multiplied by 392, the number of such parts in the length DB as the twenty-four, into which the diameter of the shot is supposed to be divided, gives

1070552

To this content add the square of the diameter 61 by 40 the number of such parts in the length AD

148840

To these two contents add four times the cube of eighteen such parts for the contents of the trunnions, cascable, and mouldings

23328

And the sum will be equal to

1242720

From this sum of these three contents deduct the square of twenty-five, the number of such parts in the diameter of the bore multiplied by its length 416 in such parts

260000

And the remainder will be equal to

982720

Which content reduced in the proportion of the area of a circle to the square of its diameter gives 771826 for the number of cubic such parts, as the twenty-four, into which the diameter of the shot is supposed to be divided, that express the solid contents of metal in the gun.

But the number of cubic parts in a ball, of which the diameter is equal to twenty-four parts, is about 7238.2464, by which, if 771826 be divided, we get 106.21 nearly, which increased in the proportion of the weight of gun metal to that of cast iron, or of 8784 to 7425, becomes 125.65 nearly, or 126 in whole numbers nearly.

Whence it is manifest that this construction gives the weight of each gun, equal to about 126 times the weight of its shot supposing the diameter of the bore to be to that of the shot as 25 to 24, a proportion, however, that certainly leaves by far too much windage. Thus a nine-pounder brads gun by it will weigh 1134 lb. or 10 cwt. and 14 lb.

He then gives a general construction for battering and garrison iron cannon supposing the length AB of each to be equal to twenty-one diameters of its shot.

He supposes the diameter of the shot to be divided into twenty-four equal parts as in the preceding construction, and makes the diameter of the bore equal to twenty-five such parts. He makes the length from A, the hind part of the base-ring, to D, the fore-part of the vent-afragal, equal to forty-eight such parts. He gives a thickness to the metal at A and D, taken from the bore, equal to twenty-five such parts, or to one diameter of the bore; and he makes its thickness at B, the mouth of the piece, equal to twelve such parts, or to half the diameter of the shot.

He supposes the centre line of the trunnions to intersect the axis of the bore at right angles, at the distance of three-sevenths of the whole length of the gun, or nine diameters of the shot from A, the hind part of the breech. He makes the diameter of each of them equal to one diameter of the shot, and the length of each, free from the projection of the second reinforce ring, equal to the same.

By this construction he allows about two hundred weight of metal for every pound of the shot's weight, or makes the weight of each gun equal to about 224 times that of its shot. And from this proportion is derived the following table for

BATTERING AND GARRISON IRON-PIECES.

Caliber.	Length.	Weight.
	ft. in.	cwt. qr. lb.
3 Pounder	4 10	6 0 0
4 Pounder	5 4	8 0 0
6 Pounder	6 1	12 0 0
9 Pounder	7 0	18 0 0
12 Pounder	7 8	24 0 0
18 Pounder	9 0	36 0 0
24 Pounder	9 8	48 0 0
32 Pounder	9 8	56 0 0

The thirty-two pounder is the only gun in this table that is shorter than twenty-one diameters of its shot, being only about nineteen of the same. It is also heavier by two hundred weight, than two-hundred and twenty-four times the weight of its shot. For these deviations, however, from his general rule, he has assigned no reasons. And for them we are inclined to think, that no good ones can be given. We are also of opinion, that a much smaller weight of metal for every pound of the shot's weight would be perfectly sufficient.

In his construction of brads guns for ships, he supposes AB, the length of the piece, to be equal to fifteen times only the diameter of the shot; which diameter he divides, as above, into twenty-four equal parts, making the diameter of the bore equal to twenty-five such parts.

He makes the distance from A, the hind part of the base-ring, to D, the fore part of the vent-afragal, equal to forty such parts; the breech AC, equal to eighteen, the thickness of the metal at A, and at D, equal to twenty, and at B, the mouth of the piece, equal to ten. The rest of the

con-

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construction is the same as above, with this exception, that the diameter, as well as the length of each of the trunnions, instead of being equal to one diameter of the shot, or twenty-four such parts, is only equal to twenty.

By a similar computation to that made use of above, it appears that this construction allows about one hundred and twenty-four pounds of gun-metal for every pound of the shot's weight, or that the weight of each gun is by it about one hundred and twenty-four times that of its shot, from which proportion, the following table is very nearly framed.

BRASS SHIP GUNS.

Caliber.	Length.		Weight.		
	ft.	in.	cwt.	qr.	lb.
3 Pounder	3	6	5	1	17
6 Pounder	4	4	6	2	14
9 Pounder	5	0	10	0	0
12 Pounder	5	6	13	1	3
18 Pounder	6	4	20	0	0
24 Pounder	7	0	26	2	7
32 Pounder	7	6	35	1	17
36 Pounder	7	10	40	0	0
42 Pounder	8	4	46	2	0
48 Pounder	8	6	53	0	14

In his general construction for iron ship-guns, he likewise supposes the length of each piece to be equal to fifteen diameters of its shot; the diameter of the shot to be divided into twenty-four equal parts; the diameter of the bore to be equal to twenty-five such parts; the distance from A, the hind part of the base-ring, to D, the fore part of the vent-astragal, to be equal to forty such parts; the breech AC to be equal to twenty-four such parts, or to one diameter of the shot; the thickness of the metal at the vent to be equal to one diameter, and at the mouth to half a diameter.

It appears by computation, that the quantity of metal, allowed by this construction, is at the rate of about one hundred and forty pounds, or of one hundred weight and one quarter to every pound weight of the shot; or that each gun is by it about one hundred and forty times as heavy as its shot; from which proportion the following table is derived.

Caliber.	Length.		Weight.		
	ft.	in.	cwt.	qr.	lb.
3 Pounder	3	6	3	3	0
6 Pounder	4	4	7	2	0
9 Pounder	5	0	11	1	0
12 Pounder	5	6	15	0	0
18 Pounder	6	4	22	2	0
24 Pounder	7	0	30	0	0
32 Pounder	7	6	40	0	0
42 Pounder	8	4	52	2	0
48 Pounder	8	6	60	0	0

In constructing light field-pieces, he makes the length of each equal to fourteen diameters of its shot, supposes the

diameter of the shot to be divided into twenty-four equal parts, and the diameter of the bore to be equal to twenty-five such parts, or to be to that of the shot as twenty-five to twenty-four.

He makes AC, the thickness of the breech, equal to fourteen such parts, the thickness of metal at the vent equal to sixteen, or two thirds of the diameter of the shot, at the mouth equal to eight such parts, or one third part of said diameter; and the distance from A, the hind part of the base-ring, to D, the fore part of the vent-astragal, equal to thirty-nine such parts.

Under the cable in each of these light pieces there is a ring of metal cast, (see fig. 2.) for fastening the head of the screw, that is employed instead of coils or wedges for elevating or lowering the gun. This ring is described from the same centre and with the same radius that the neck is. The diameter of the hole for receiving the bolt is equal to five parts, and the thickness of the ring to four. The diameter, as well as the length of each trunnion, is equal to sixteen parts, and the rest of the construction is the same as in the first.

By it the quantity of metal is at the rate of about eighty-five pounds for every pound of the shot's weight, or the weight of each gun is about eighty-five times as great as that of its shot, which proportion gives the following table.

FIELD PIECES.

Caliber.	Length.		Weight.		
	ft.	in.	cwt.	qr.	lb.
3 Pounder	3	3	2	1	2
6 Pounder	4	1	4	2	5
9 Pounder	4	8	6	3	8
12 Pounder	5	1	9	0	10
18 Pounder	5	10	13	2	16
24 Pounder	6	5	18	1	5

He also gives a construction for iron garrison-pieces, supposing the length of each to be equal to eighteen diameters of its shot, and the rest of the construction to be the same as that for iron ship-guns, allowing thereby about one hundred and seventy-two pounds, and two thirds of a pound of metal to each piece, for every pound of the shot's weight, which proportion produces the dimensions and weights in the following table.

IRON GARRISON PIECES.

Caliber.	Length.		Weight.		
	ft.	in.	cwt.	qr.	lb.
3 Pounder	4	2	4	2	12
6 Pounder	5	3	9	1	0
9 Pounder	6	0	13	3	12
12 Pounder	6	7	18	2	0
18 Pounder	7	6	27	3	0
24 Pounder	8	4	37	0	0
32 Pounder	9	2	49	2	18
42 Pounder	10	0	64	0	0

CANNON.

Of short Cannon, such as Mortars, Howitzers, and Carro-
nades.

Mortars are a fort of cannon with short and large bores, with chambers, and are thought to be the first pieces of artillery that were used, as they were employed to throw balls of red-hot iron and stones long before the invention of shells, which is ascribed to a native of Venlo, who at a festival celebrated in honour of the duke of Cleves, threw a number of them, one of which, falling on a house, set fire to it, which rapidly communicating to other building, reduced the greatest part of the town to ashes. Mortars which are generally believed to be a German invention, are said to have been actually made use of for military purposes in 1435, when Naples was besieged by Charles the 8th. But whether shells were then thrown out of them is uncertain. It is known, however, to a certainty, that shells were thrown from mortars at the siege of Wachlen-donk, in Guelderland, by the earl of Mansfield, in 1588. Cyprian Lucas wrote upon the method of filling and throwing shells, in his appendix to the colloquies of Tartaglia, printed at London in 1588, in which performance, the method of composing and throwing carcases as well as various sorts of fire-works, is also shewn.

Mr. Malter, an English engineer, is said to have first taught the French the method of throwing shells, which they practised at the siege of Lamothe in 1634.

Mortars, however, have been long made use of, chiefly for throwing *hollow balls*, called *shells*, filled with a sufficiency of powder for bursting them, which, falling on any building, or into the works of a fortification, or among troops encamped, forming in order of battle, in column, or landing from vessels or boats, &c. are burst or broken by the force or explosion of the powder in them into a number of pieces or fragments, which, flying in all directions, occasion trepidation and confusion, and are destructive to every thing within their reach. They are also frequently made use of for throwing carcases, which are a fort of shells with five holes filled with pitch and other combustibles, in order to set fire to buildings. Baskets full of stones about the size of a man's fist, or of hand-grenades, are sometimes thrown from them during a siege into the covert-way, on the men employed in defending it. The ingenious general Desaguliers contrived a method of throwing bags from them filled each with from four to six hundred shot of different dimensions. The effect of such an application of them, by pouring down shot somewhat like a shower of hail on spots three hundred feet at least each of them in circumference, must be awful and tremendous to troops moving in column, forming in line of battle, passing a defile, landing, &c. &c.

Mortars are, in this country, commonly distinguished by the diameters of their bores. Thus a thirteen inch mortar, a ten inch mortar, an eight inch mortar, are those which have the diameters of their bores respectively equal to thir-

teen, ten, and eight inches. These are the three largest sized mortars employed by us for land service. Besides them there are two smaller sized sorts of mortars, one of which is called a royal, having the diameter of its bore equal to 5.62 inches, and the other a cohorn, taking its name from its inventor, Mr. Coehorn, the celebrated engineer, and having the diameter of its bore equal to 4.52 inches.

The principal part of a mortar on the outside, (see fig. 4.) are, A the chace, including the muzzle, B the reinforce, C the breech, and D the trunnions. The smaller exterior divisions are, the vent, the dolphins, the vent-astragal and fillets, the breech-ring and ogee, the reinforce ring and ogee, the reinforce-astragal and fillets, the muzzle astragal and fillets, the muzzle-ring and ogee, and the shoulders.

The interior parts are, the chamber which receives the charge of powder, the bore where the shell is lodged, the mouth, and the vent.

The chamber is formed variously by different nations. The Spaniards chiefly use the spheric; the French, the Germans, and the Dutch make use of various forms for it, as the conic, the cylindric, the bottled or the concave; the Portuguese the parabolic, and the English have usually made it in form of a frustum of a cone. No very satisfactory reasons, however, have been assigned for this variety.

Mortars are made of brass, iron, or stone.

Land-mortars are those that are used in sieges and on other land service mounted on beds. Both they and their beds are transported on truck-carriages. There is also a kind of land-mortar invented by count Buckeburg, which is mounted on a travelling carriage, and may be elevated to any degree at pleasure.

Sea-mortars are those that are made use of for sea-service, such as the bombardment of places by water, &c. As the objects they are fired at and intended to destroy are generally at greater distances from them than those to which land-mortars are required or expected to throw their shells, they are somewhat longer than them and much heavier.

Partridge-mortar is a common mortar surrounded by thirteen other little mortars bored round its circumference in the body of the metal. The large mortar in the centre is loaded with a shell, and the others with grenades. When it is fired by the vent the fire is so communicated at the same time to the small ones, that both the shell and grenades go off at once. The French used them in the war of 1701, at the defence of Bouchain, in 1702, and at the siege of Lisle, in 1708.

Hand-mortars were frequently made use of before the invention of coehorns. They were fixed to the ends of staves about four feet and a half long, of which the other ends were shod with iron for sticking them in the ground. A bombardier elevated one of them at pleasure with one hand, whilst he fired it with the other.

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The dimensions of brass land-mortars now made use of in our service are the following.

	Inches.	Inches.	Inches.	Inches.	Inches.
Diameter of the bore	13	10	8	5.8 or 5.62 rather.	4.6 or 4.52 rather.
Total length of the mortar	44	33	25.5 to 26	16 to 16.5	13.5
Distance from the muzzle to the reinforce	15.25	10	8.5	4.75	4.2
The length of the reinforce	8.75	8.1	5	5	3.9
The length of the trunnions from end to end	32.5	26	20	12	9.2
Diameter of the trunnions	7.15	6.3	5	2.75	2.15
The length of the bore	24	18	13	8.5	7
Length of the chamber	12	7.8	7.75	4.3	3.7
Greatest diameter of the chamber	6.6	4.5	4	3	2.7
Least diameter of the chamber	6	3.6	3.4	2.4	1.4
The diameter of the muzzle-ring	21	15.15	11.2	8	6.4
The breadth of the muzzle-ring	1.1	0.8	0.7	0.6	0.5
The breadth of the astragals and fillets	1.25	1	0.75	0	0
Their distance from the muzzle-ring	1.5	1	1	0	0
The diameter near the muzzle-astragal	18.1	13.2	10	6.9	5.6
The diameter near the reinforce	18.1	13.2	10	6.9	5.6
The diameter of the reinforce	21	15.15	15.1	8	6.4
The breadth of the ogees	1.5	1	1	0	0
The diameter behind the breech-astragal	18.1	13.2	9.8	6.9	5.9
Chambers contain powder	lb. oz. gr. 9 1 8	lb. oz. gr. 4 0 0	lb. oz. gr. 2 0 10	lb. oz. gr. 1 0 10	lb. oz. gr. 0 8 0

It is proper to observe, that the extremity of the bore next to the chamber is made round, and formed by an arc, which has its radius equal to that of the bore, and is terminated by the lines that form the chamber. The bottom of the chamber itself is semicircular. And the outside of the metal is determined by a circular arc described from the same centre as the bottom of the chamber, and touching the lines drawn parallel to its sides.

By means of these data, and the foregoing dimensions accurately delivered, such mortars may easily be constructed from the plate which exhibits the form of one.

The following are the dimensions of the sea-mortars that are used at present in our service, (see *figs. 5. and 6.*), which are of two sizes only, viz. of thirteen inches and ten inches bore.

	Inches.	Inches.
The diameter of the bore	13	10
The whole length of the mortar	63	56
The distance from the muzzle to the reinforce	21	20
The length of the reinforce	18	12
The length of the bore	24	30
The length of the chamber	21	15
The greatest diameter of the chamber	8.5	6.6
The least diameter of the chamber	7	6
The breadth of the muzzle-ring	3	2.4
The breadth of the muzzle, ogee, and fillet	1.9	0
From the muzzle to the astragal	0	0.4
The breadth of the astragal	0	1.6
The breadth of the reinforce ring	1.9	0
The breadth of the ogee next to the reinforce-ring	4.5	2.2
The breadth of the chase-ring	1.5	0
The breadth of the chase-ogee	2.2	0
The breadth of the chamber-astragal	0	1.6
The thickness of the metal at the muzzle	4.7	2.8

The thickness of the metal at the muzzle-ring	Inches. 5 ³ / ₄	Inches. 6
The thickness of the metal near the reinforce	4.7	3.3
The thickness of the metal at the reinforce	8	6
The thickness of the metal behind the reinforce	9.5	6
The length of the trunnion from end to end	45.4	36
Its greatest diameter	12	8
Its least diameter	10	8
Length or the part diminished at each end	6	0

The chamber contains powder	lb. oz. gr. 32 0 0	lb. oz. gr. 12 8 0
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Thickness of the metal at the muzzle, and near the reinforce is taken or measured from the lines produced, which determine the bore of the mortar; and behind the reinforce it is taken or reckoned from the lines which form and terminate the chamber. The round part, or the breech of the mortar, is circular, and in the ten-inch mortar is described from the same center that the bottom of its chamber is described from. But in the thirteen-inch mortar it is described from a center about three inches and a half nearer to the end of the mortar than that from which the bottom of its chamber is described. And in both these arcs ought to touch right lines drawn parallel to the sides of the chambers.

The invention of Howitzers is of a much later invention than that of mortars. The Howitzer is, however, one of the most useful pieces of artillery, as it can be employed on most occasions either as a cannon or mortar, and is easily moved by an army from place to place. It has its trunnions nearly in the middle, and is mounted on a carriage like a travelling gun carriage. The ten-inch howitzer is the largest in our service, and is not much made use of. It has been

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been reduced but little as to length, but materially in point of weight from what it was formerly. The following are the dimensions of the eight inch howitzer that we now use. See *fig. 7.*)

	Inches.
The diameter of the bore	8
The distance from the muzzle to the reinforce	16
The length of the reinforce	10.7
The whole length of the howitzer	37.4
The length of the bore	25.9
The length of the chamber	9.9
The greatest diameter of the chamber	4.6
The least diameter of the chamber	4
The breadth of the muzzle ring	1.25
The distance from the muzzle-ring to the astragal	4.6
The breadth of the astragal	0.7
The breadth of the ogee before the reinforce	1.4
The breadth of the ogee behind the reinforce	0 or it has none.
The breadth of the astragal behind the reinforce	0.7
The breadth of the base-ring	1.25
The thickness of the metal at the muzzle	2.25
The thickness of the metal at the muzzle ring	3.4
The thickness of the metal near the reinforce	2.6
The thickness of the metal at the reinforce	3.4
The thickness of the metal behind the reinforce	2.5

	Inches.
The diameter of the base-ring	14.7
The diameter at the vent-astragal	12.5
The diameter of the cascable	7.6
The diameter of the neck	5
The diameter of the neck	3.5
The breadth of the first ogee and fillets	0.9
The breadth of the second ogee and fillets	0.9
The diameter of the first fillet	9.5
The diameter of the second fillet	4.5
The length and the diameter of each trunnion	4.4
The distance from the fore part of the reinforce to the trunnions	1.2
	lb. oz.
The chamber contains powder	4 0
	cwt. qr. lb.
The weight of the howitzer	from 12 3 0 to 12 1 11

The constructions of howitzers are almost as variable and uncertain as those of mortars, as most artificers have notions of their own respecting the figures of both. Our mortars have not been constructed from principles well ascertained, or from any general rule applicable to all sizes of them. Neither have our howitzers. Mr. Muller was the first that we know of, that made even any attempt at such general rules for the construction of either of all sizes. But he neither demonstrates the principles of his general rules, nor proves them to be unexceptionable. His general dimensions for land mortars supposing the diameter of the bore of each to be divided into thirty equal parts are the following. See *fig. 8.*

	Diameter of the bore divided into 30 equal parts.	Diameter of the bore divided into 30 equal parts.	Diameter of the bore divided into 30 equal parts.
The diameter of the bore			
The diameter of the chamber	10 such parts	10 such parts	10 such parts
The length of the bore equal to	54	45	40
The length of the chamber equal to	22	21	20
The distance from the end of the chamber to the end of the mortar	16	15	14
The total length of the mortar equal to	92	81	74
The distance from the mouth <i>a</i> to the reinforce <i>b</i>	30	26	21
The length of the reinforce <i>bc</i> equal to	18	14	14
The breadth of the muzzle-ring and fillets	3.5	3	3
The breadth of the ogee next to it	3	2	2
The distance from the ogee to the muzzle astragal	5	4	3
The breadth of the astragal and fillets	2.5	2	2
The breadth of the ogee before the reinforce	3	2	2
The breadth of the two ogees and fillets behind the reinforce	6	5	4
The thickness of the metal at the muzzle	5	4.5	4
The thickness of the metal near the reinforce	6	5	4.5
The thickness of the metal at the reinforce	7	5.5	5
The thickness of the metal at the chamber	12	12	12
The thickness of the metal at the muzzle-ring	6.5	5.5	5
The diameter of the trunnions	14	13	12
The length of the trunnions from the mortar	15	14	13
The cube of the diameter of the bore in inches	d^3	d^3	d^3
The quantity of powder in lb. which the chamber contains is nearly equal to	d^3	d^3	d^3
	421	442	466
	$5d^3$	$2d^3$	$3d^3$
The weight of the mortars equal nearly to	6	3	5

Without attempting, as we have already observed, to demonstrate the principles of this general construction, he tells us that he has endeavoured to dispose, distribute, or arrange the metal in such a manner, as to make the relative degrees of strength in the different parts proportional to the forces which act upon them. He thinks the thickness of metal at the chamber sufficient, as it exceeds by two parts the diameter thereof, which is more in proportion than what is ever allowed to any brass gun whatever. He observes that though the mortar on the outside ought to be conical from the chamber to its mouth, to suit the action of the powder, he has, in compliance with common practice, given it a reinforce just sufficient to admit of an ogee.

He tells us he does not pretend to determine the true position of the vent, though he had always found that the nearer it was placed to the bottom of the chamber, the farther the mortar threw the shell with a given charge of powder. As he made these experiments, however, with only a three-inch mortar, he apprehends that no just conclusions can be drawn from them with regard to mortars of a larger size.

He delivers it as his opinion, that the cylindric figure is the best for the chambers of such mortars, observing, that though the bottled or concave chambers, or those which have the smallest entrances, will throw shells farther than any others; yet in those which require but little powder their entrances would be too narrow, and it would be troublesome to clean them; whereas, when they are cylindrical, they are very nearly as advantageous for throwing shells without being subject to these inconveniencies.

He informs us, that he and general Desaguliers made several experiments with chambers of different forms or figures, which contained the same quantity of powder, and uniformly found, that the cylindric threw the shell farther than any other, of which the entrance was larger, particularly when they were not quite filled; that they also made some experiments with cartridges of common writing paper holding charges of powder only equal respectively to half the content of the chamber, and found that when such a cartridge was so placed in the chamber as to be close to the shell, leaving a vacuity between it and the bottom, it threw the shell nearly twice as far as it did when it touched the bottom of the chamber, and left a vacancy between itself and the shell; that these experiments were repeated several times, and always gave the same result. He also informs us, that on filling the chamber partly with powder and putting a piece of common writing paper upon it, he found that the shell went much farther than the same charge without paper threw it; that they likewise made repeated experiments with a cylindrical chamber, and a conical one of the same length and content, that had its diameter at the bottom equal only to half that at its entrance, and observed, that when these chambers were not quite filled, the cylindric one uniformly threw the shell much farther than the other did.

The first sort of mortars in this general construction, or those of which the weights are expressed by $\frac{5d^3}{6}$, have the same lengths which the land mortars have that we now make use of. The second, or those of which the weights are expressed by $\frac{2d^3}{3}$, are of the same lengths with those the French have been in the practice of using. And the third sort, that have their weights denoted by $\frac{3d^3}{5}$, are shorter than either. In each of them the chamber is cylindric, and the

bottom of it a hemisphere. And the round part of the mortar is described from the same centre as the bottom of the chamber.

In his general construction for sea mortars the dimensions are the following. See *fig. 9.* Our sea mortars, as we have already observed, are of two sizes only, viz. of 13 inches and 10 inches.

The diameter of the bore -	Diameter of the bore divided into 30 equal parts.	Diameter of the bore divided into 30 equal parts.
The length of the bore -	75 such parts	75 such parts
The diameter of the chamber -	15	15
The length of the chamber -	33	33
The distance from the end of the chamber to the end of the mortar -	20	20
The total length of the mortar -	128	128
The distance from the muzzle <i>a</i> , to the reinforce <i>b</i> -	43	43
The length of the reinforce <i>bc</i> -	28	28
The thickness of the metal at the muzzle, the mouldings excepted -	8	7
The thickness of the metal near the reinforce -	9	8
The thickness of the metal at the reinforce -	10	9
The thickness of the metal at the chamber -	16	16
The breadth of the muzzle-ring and fillets -	4	4
The breadth of the ogee next to it as also of that before the reinforce -	3	3
The distance from the ogee to the muzzle-astragal -	6	6
The breadth of the astragal and fillets -	3	3
The breadth of the ogee behind the reinforce -	4	4
The muzzle-ring projects the metal by -	1.5	1.5
The diameter of the trunnions -	18	18
The length of each trunnion from the mortar -	20	20
The cube of the diameter of the bore -	d^3	d^3
The quantity of powder in lbs. which the chamber contains -	$\frac{d^3}{126}$	$\frac{d^3}{126}$
The weight of the metal -	$2.1 \times d^3$	$1.8 \times d^3$

The arc which determines the round part of each mortar is described from the same centre which the arc, that determines the bottom of the chamber, is described from.

The weights of our present sea mortars, and the quantities of powder which their chambers contain, compared with those which these constructions give, will stand as follows.

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	Inches.			Inches.		
	13			10		
	cwt.	qr.	lb.	cwt.	qr.	lb.
The diameter of the bore	82	0	0	33	0	0
The weights of our present sea-mortars	41	0	19	18	2	19
The weights of sea-mortars by the first of these two constructions $= 2.1 \times d^3$	35	1	2	16	0	7
The weights of sea-mortars by the second of these constructions expressed by $1.8 \times d^3$	32	0	0	12	8	0
The quantities of powder, which the chambers of our present sea-mortars contain	17	7	0	8	0	0
The quantities of powder, which the chambers of sea-mortars by these constructions would contain						

Besides these kinds of mortars for throwing shells and carcasses, there is another sort of mortar for throwing stones either by the besieged from the body of the place, the out-works, or covert way into the besiegers approaches on the glacis, &c. or by the besiegers into the covert way, &c. as they approach the same. There are no such mortars employed in our service; because hand-grenades, or small shells thrown from a common mortar with small charges of powder, answer the purpose intended much better than stones.

The following, however, are the dimensions of a fifteen-inch stone mortar, supposing the diameter of the bore to be divided into thirty equal parts. See *fig. 12*.

The diameter of the bore divided into	30	equal parts
The length of the bore	37	such parts
The length of the chamber	16	
The greatest diameter of the chamber	8	
The least diameter of the chamber	6	
The diameter of the cylindric part to hold a wooden tompon	14	
The depth or axis of that cylinder	3	
The distance from the muzzle to the reinforce	20.5	
The length of the reinforce	8	
The thickness of the metal at the muzzle	3.5	
The thickness of the metal at the reinforce	4.5	
The thickness of ditto at the chamber-belt	9	
The thickness of ditto at the entrance of the chamber	6	
The chamber enters into the trunnions by	2	
The breadth of the muzzle-ring and fillets	3	
The breadth of the chamber-belt is equal to	2	
The breadth of the ogee next to that belt	3	
The cube of the diameter of the bore	d^3	
The quantity of powder in lbs. which the chamber contains	$\frac{d^3}{1102}$	
The weight of the metal contained in this mortar	$\frac{d^3}{3.1}$	

The dimensions, according to his construction, of howitzers of three different weights, with the same bore, are the following. See *fig. 10*.

The diameter of the bore divided into equal parts	30	30	30
The length of the bore	90	90	97.5
The diameter of the chamber	15	15	15
The length of the chamber	33	33	33
The distance from the muzzle <i>a</i> , to the reinforce <i>b</i>	50	50	54.5
The length of the reinforce <i>bc</i>	34	34	37
The distance from the reinforce <i>c</i> , to the end of the howitzer	50	50	50
The whole length of the howitzer	134	134	141.5
The thickness of the metal at the muzzle	8	7	8
The thickness of the metal near the reinforce	9	8	9
The thickness of the metal at the reinforce	10	9	10
The thickness of the metal at the chamber	16	15	16
The breadth of the muzzle-ring as also of the base-ring, fillets included	5	5	5
The breadth of each of the ogees, that behind the reinforce excepted	3.5	3.5	3.5
The distance between the muzzle ogee and astragal, as also between the breech ogee and astragal	6	6	7
The breadth of the muzzle-astragal and fillets, as also of the breech astragal and fillets	3	3	3
The breadth of the ogee behind the reinforce	6	6	6
The muzzle and base-rings project the metal each by	1.5	1.5	1.5
The length of the trunnions	18	18	18
The diameter of the trunnions	15	15	15
The distance of the trunnions from the fore end of the reinforce	5	5	5
The cube of the diameter of the bore	d^3	d^3	d^3
The quantity of powder in lbs. which the chamber contains	$\frac{d^3}{116}$	$\frac{d^3}{116}$	$\frac{d^3}{116}$
The weight of the howitzer	$2.25d^3$	$1.97d^3$	$2.4d^3$

The length of the cascable is equal to 24 such parts, the radius of the button to 8, and the ogee with the fillet included is equal to 4.

It is somewhat surprising that howitzers are not more made use of than they are even in the field. For they may be employed successfully for throwing, not only large shells, but large, solid, or cored shot, either point blank, or with small angles of elevation, and with charges of powder suited to different ranges and grazing distances to the great annoyance both of cavalry and infantry, particularly in column. They are also much fitter than guns for discharging grapes of small shot and small shells from short distances at sieges; and are peculiarly calculated for sweeping or scouring the covert way along its several branches with shells fired *en ricochet*. No earthen works are proof against them when a judicious use is made of them. Even at sieges, when the works have revetements, or demi-revetements of masonry, as soon as the walls which support the earth of the rampart and parapet are

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are battered down, there is no speedier or more effectual way of completing the breaches and rendering them practicable than by throwing shells into the earth where it is bared of masonry. For they lodge or bury themselves in it, and bursting operate as small mines.

Fig. 11 represents a mortar with a bottled or concave chamber, the diameter, *ab*, of the entrance of which is a third part of the diameter of the bore. The distance from *ab* to *cd* drawn parallel and equal to it in the longitudinal section is equal to twenty-six such parts as those, of which the diameter of the bore contains thirty. The conjugate diameter of the chamber is equal to twenty such parts. The form of the outside of the mortar, where the chamber is, is similar to that of the chamber itself. The thickness of the metal at the chamber is equal to sixteen such parts, and all the other dimensions are the same as in the first construction for mortars above.

As the entrance of the chamber has its diameter equal to a third part of the diameter of the bore of the mortar, it is large enough in one of either thirteen or ten inches for admitting a man's hand to clean it without inconvenience, and may therefore be loaded without difficulty.

Besides these pieces of ordnance, there is another, that is now pretty generally used, and is called a carronade, from a foundry that has for a considerable time been carried on by a company under the name of the Carron Company, on the banks of the river Carron in Scotland. The carronade is a gun of a sort of intermediate length and weight between the cannon and the howitzer, and not a very short howitzer, as the celebrated Dr. Hutton has inadvertently observed in his Mathematical Dictionary. The first inventor, proposer, or inventor of it was the present learned and ingenious General Robert Melville, so well known for his talents as a military antiquarian, and the discoverer of the temporary Roman camps in North Britain. He at first suggested that not only solid but shell shot might be thrown from it, and afterwards that it might be employed for throwing carcasses and cored shot. The first gun of this nature was cast and constructed according to his suggestions at Carron in 1779 after a rupture with France, and during the American war. The operation was performed under the directions of that very able founder, Charles Gascoigne Esq. then director of that foundry.

The diameter of its bore was equal to eight inches, having the same caliber with an eight-inch mortar or howitzer.

The length of its bore including the chamber was equal to six diameters of the same very nearly, or to six times its caliber or four feet.

The diameter of its chamber was equal to the caliber of a forty-two pounder gun, and contained five pounds and a half of powder.

Its weight was nearly equal to that of the navy twelve pounder-gun, being equal to 31 cwt.

The shot was cast in an eight-inch spherical iron mould, and the windage was formed by the retreat or shrinking of the metal of the shot in cooling, which when cold weighed about 68 pounds, or about four pounds less than a solid iron shot or ball eight inches in diameter, which weighs about 72 pounds very nearly. From this circumstance it came to be called a 68 pounder, though its original proposer or inventor gave it the name of a *smasher* from its effects, particularly when fired with shot at timbers or wooden work. It was at first designed for a ship gun. And there is now in the possession of General Melville a small model of it mounted on its carriage on a small platform, to one end of which is fastened a wooden representation, in miniature, of part of a ship's side, with a port, and the following inscription in brass, let in on the top thereof.

"Gift of the Carron company to Lieutenant General Melville, inventor of the smashers and lesser carronades for solid, ship, shell, and carcass shot, &c. first used against French ships in 1779."

In the middle of the lower carriage there is a longitudinal groove, along which the gun on its upper carriage recoils. And when so mounted, it may be pointed in any angle less than forty degrees either to the right or left of this groove. A port or embrasure large enough for a 24 or 32 pounder gun is also sufficiently large for receiving the smasher or 68 pounder carronade.

Several experiments were made with one of this caliber the same year, viz. in 1779, at Carron, in the presence of Sir Adolphus Oughton, K. B. then commander in chief in Scotland, General Melville, and many other officers, some of whom were of the corps of artillery and engineers, with such success, both in regard to the projectile force, with which the shell-shot were thrown, and not only the practicability but also the certainty of their producing powerful effects, by bursting wherever they should penetrate, as perfectly convinced Sir Adolphus and all the rest, that in all fit cases, which might be many, by sea as well as by land, for the use of this species of artillery, the introduction of such pieces of ordnance both into his Majesty's naval and military service would be of the greatest utility and advantage. Sir Adolphus thought it therefore his duty to transmit to government a fair and candid report of the experiments he had seen made, and a statement of the advantages which he conceived might be obtained by a judicious and proper use of such guns. It happened, however, that no encouragement was then given to the introduction of this species of cannon, though it was so respectably recommended and approved of by intelligent professional men, because it was regarded as a novelty, an innovation, and a departure from common hack-nied practice and customs, by which public boards, that are but rarely composed of individuals of the first talents, liberality, and information, are for the most part too slavishly governed. The proprietors of the Carron foundry, however, were advised to try whether pieces of sundry smaller dimensions, cast and constructed on the same principle, would not meet with a sufficient sale for private vessels of war, as letters of marque and reprisals, and perhaps for some of the royal frigates. They made the trial, and succeeded. For, besides a pretty frequent demand that was made for them during the remainder of that war for the use of the two former descriptions of vessels, on account of the great advantages they were found in practice to possess over common guns of the same weights, and much smaller calibers, there were some of the larger sort or of 8 inches caliber, called smashers by the original proposer, introduced by degrees into the navy. Two of the naval officers, who first made use of them on board their ships, were Captain Keith Elphinstone, now Admiral Lord Keith, and Captain Henry Trollope, now Sir Henry Trollope, the latter of whom, in a most remarkable instance, by means of two smashers which he had on board his frigate, beat off several of the enemy's, who were panic-struck on viewing the size of some of the shot he fired into them.

Soon after the commencement of the royal war against France, in which Great Britain engaged early in 1793, carronades of various dimensions, but few of the larger size, or smashers, improperly called 68 pounders from each of their solid iron-balls, which are not near so fit for sea service as hollow or cored shot of the same diameter, but much lighter, came rapidly into use in our ships of war and other armed vessels, and often proved to be of the greatest utility and advantage.

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vantage. They have ever since been reckoned so useful, that there is now hardly a ship in our navy or an armed vessel, that is altogether without them.

When the carronades were first introduced, they were meant chiefly for the defence of merchant ships, and were calculated, by their construction, to be of such lengths and weights as might be convenient for the sizes of the vessels that were to carry them, supposing each of them to be loaded with a twelfth part of the weight of its shot, as the service-charge of powder. The Board of Ordnance was pleased to order a number of them for the navy: and their first warrant for about 1500 of them was completed before Mr. Gascoigne was certainly informed that the board had fixed on one-ninth instead of a twelfth part of the weight of the shot as the charge of powder for service. These were therefore reckoned both too light and too short for the navy. And on the Board's afterwards ordering 20 carronades of each of the natures of 12, 18, 24, and 32 pounders, he very naturally took the liberty of adding both to the length and fortifications of each of them, so as to increase its strength and power of resistance to bursting, in proportion to this perhaps ill-judged addition to the charge of powder, substituting also a screw instead of the quoin or wedge. Forty of them were proved at Woolwich, and were afterwards rejected on account of these very improvements.

The late colonel Frazer, of the engineer corps, made a

number of experiments at Leith with a *smasher*, or 68 pounder carronade, both with its own solid shot and with common eight-inch shells, which were corroded by rust, and, independent of that circumstance, had by far too much windage. And it is worthy of remark, that notwithstanding this, the shells went farther than the solid shot before they met the surface of the earth or of the water, or had their first grazes greater when the gun was fired, either horizontally or point blank, or with any elevation not exceeding two degrees, but that with any elevation from two degrees upwards the solid shot went farthest.

The following is an exact statement of experiments made at Languard fort on the 27th and 28th of July, 1780, by order of marquis Townshend, then lord viscount Townshend, and master-general of the ordnance, and comparative trials with a ten and eight-inch howitzer.

Practice with a 68 pounder carronade, or smasher.

The weight of the piece in cwt. qr. lb. 29 0 0.

The length of the piece in feet and inches, from the hind part of the base ring to the muzzle, 3 11⁹/₁₆.

The length of the bore, chamber included, 3 11.

The diameter of the bore, 8 inches.

The nature of the rope for breaching, 2¹/₂ inches.

The length of the recoil, in feet and inches, 12 3.

Weight of the solid shot, 68 lb.

Weight of the shell shot, 57 lb.

Time when.	Rounds.	Weight of Powder.	Diameter of		Windage.	Elevation.	Time of Flight to first Fall.	Grazes			Extreme Range.
			Shot.	Shells.				1	2	3	
1780.	No.	lb. oz.	inches	inches	inches	degrees	secs.	yards	yards	yards	yards
27th July	1	4 0	7.90	7.94	0.10	Point blank.	3 ¹ / ₂	154	508	875	1345
	2				0.06		2 ¹ / ₂	168	473	816	1365
	3		7.94		0.06	1°	2 ¹ / ₂	362	638	875	1320
	4			7.94	0.10		2	244	500	610	1260
	5		7.94	7.89	0.06	2°	2 ¹ / ₂	497	665	810	1410
	6				0.11		3 ¹ / ₄	555	640	840	1500
	7		7.94		0.06	Point blank.	2 ¹ / ₂	250	620	1120	1400
	8	5 8		7.94	0.06		2	262	608	960	1435
	9		7.92		0.08	1°	2 ¹ / ₂	444	902		1710
	10			7.92	0.08		2	475	1050		1310
	11		7.95		0.05	2°	2 ¹ / ₄	620	815	1100	1550
	12			7.91	0.09		3	760	925		1490
	13			7.90	1.10	3°	3 ¹ / ₂	818	865		1620
28th July	14	6 0	7.91		0.09	P. B.		260	573	850	1520
	15		7.92		0.08	1°		471	900	1000	1315
	16		7.95		0.05	2°		662	1200	1300	1460

A 10 inch brads howitzer, weighing 23 cwt. 3 qr. and 7 lb. fired horizontally, or point blank, with five pounds of powder, had its first graze at the distance of 112 yards, with one degree of elevation at 200 yards, with two degrees of elevation at 300 yards, and with three degrees of elevation at 414 yards.

When fired horizontally, or point blank, with six pounds of powder, it had its first graze at the distance of 80 yards, with one degree of elevation at 225 yards, with two degrees of elevation at 290 yards, and with three degrees of elevation at 445 yards.

An eight-inch brads howitzer fired horizontally or point blank with two pounds of powder, had its first graze at the distance of 119 yards, with one degree of elevation at 195

yards, with two degrees of elevation at 200 yards, and with three degrees of elevation at 246 yards.

When fired horizontally or point blank with three pounds of powder, it had its first graze at the distance of 125 yards, with one degree of elevation at 208 yards, with two degrees of elevation at 278 yards, and with three degrees of elevation at 336 yards.

The recoil of the ten inch howitzer fired horizontally or point blank was 11 feet with 5 pounds of powder, and 13¹/₂ feet with 6 pounds of powder.

The recoil of the eight-inch howitzer fired horizontally or point blank with 2 pounds of powder was 10 feet, and with 3 pounds of powder 16 feet.

An iron 24 pounder, of the late lord Howe's construction, fired with six pounds of powder and one degree of elevation, had

had its first graze, on a medium of four trials, at the distance of $471\frac{1}{2}$ yards; and with five pounds of powder and the same elevation, on a medium of two trials, at $507\frac{1}{2}$ yards.

A 32 pounder iron gun fired horizontally or point blank with high shot and four pounds of powder, had its first graze at the distance of 200 yards, with the same shot, charge, and one degree of elevation at 465 yards, and with two degrees of elevation at 675 yards.

And the same gun with the same charge, point blank, and the same elevations, but with low shot, gave the first grazes at 220, 395, and 662 yards respectively.

These experiments clearly prove the great superiority of the smasher, or 68 pounder carronade, over not only the eight-inch howitzer of the same bore with it, but also over the ten-inch howitzer, which is the largest in our service, and has its bore to that of the smasher as 100 to 64, and the diameter thereof to that of the smasher as 10 to 8.

They also shew, that it is nearly on a footing with the common iron 24 and 32 pounder, as to its first grazing distance, which is a material point in sea-service, and has greatly the advantage of them, particularly in close combat, by the size of the holes which its shot make in the sides of a ship, and from their likewise passing through the same with less velocity. For a shot, especially if its diameter be but small, that passes very quickly through a ship's side, makes only a clean hole, whereas one of a large diameter, that penetrates it with less celerity, makes a rough and ragged one, by tearing and splintering the planks and timbers. And it is well known that shot fired at sea with a greater elevation than five degrees, are of no use whatever, unless they hit the object they are fired at before they meet the surface of the water, as they never graze or rise again from it when fired with so great an elevation. It may be objected to the use of smashers on board a ship, that their shot are too heavy to be easily handled and put into the gun. This objection holds good against the use of them with their shot in its solid form, which of all others is the most unfit for sea-engagements. It vanishes, however, when it is considered that the weight of its shot may be reduced by leaving it hollow, or with a core in the centre, from 68 pounds down to 42 pounds and under, and still retain thickness and strength of metal enough for penetrating the side of any ship whatever. This fact has been established beyond even the possibility of controversy by some experiments that were made at Woolwich in 1781, in the presence of general Melville who proposed them, and his grace of Richmond, then master-general of the ordnance. For in July that year Mr. Gascoigne sent from Carron to Woolwich for that purpose six hollow smashers, or 68 pounder carronade shot, weighing from 55 pounds to $55\frac{1}{2}$ pounds, six others reduced in weight from 68 to from 50 to $50\frac{1}{2}$ pounds, six others weighing only from $45\frac{1}{4}$ pounds to about $46\frac{1}{2}$, and six reduced down from 68 pounds so low as from about 43 pounds to 40. The lightest of these were fired into a bulk-head, as thick as the side of a first rate, from a suitable distance. They easily penetrated it, and one of them, after penetrating, striking against an oak post or stud, nine inches square, tore, shattered, and splintered it almost to pieces. The master-general, after viewing its effects, said it would have been a terrible shot against a ship, and very justly observed, that as the lightest of these hollow shot were found to answer perfectly, it was unnecessary to try the heavier ones. We are convinced, indeed, that the shot of a smasher, or 68 pounder carronade might, by means of concentric cavities, be reduced down to the weight of 32 pounds, and still retain strength and thickness of metal sufficient for penetrating the side of any ship. In this state they would be much more easily handled than a common 32 pounder shot,

having a larger diameter and a much larger surface. These experiments shew, that they are sufficiently strong for that purpose when brought down to within eight pounds of that weight. And if, in addition to this fact, it be also taken into consideration, that a multitude of experiments made with smashers, or 68 pounder carronades, concurred in establishing this point, that when fired either point blank or with any elevation not exceeding two degrees, the hollow shot went farther than the solid shot before they met the surface either of the ground or water, it must readily be allowed, that they are peculiarly calculated for naval combats. But were these hollow shot to be fired as shells, with a sufficiency of powder in their cavities for bursting them, they would be truly terrible and tremendous to shipping in a sea-fight. It may be alleged, that the enemy would soon also get into the use of them as shells. It is true that after a time he might: but whoever shall make this use of them in a great naval action, he will certainly derive infinite advantages from it. And we trust our enemies will not be the first to make such an application of this very useful piece of ordnance.

Of the position of the vent in cannon, and other pieces of ordnance.

As the inflammation of fired gunpowder is almost instantaneous, it is natural to conclude, that the impulsive force of a given charge of it is not, *ceteris paribus*, sensibly altered by its being fired in any particular part or point of it; and of course, that neither the initial velocity nor range of a ball is sensibly affected by the position of the vent. This is a fact that has been sufficiently established by experiments made at Woolwich, by the learned Dr. Hutton, and several respectable officers of artillery, under the authority and direction of the board of ordnance.

The vent is vulgarly called the *touch-hole*; and is the narrow cylinder or opening through which fire is conveyed from the outside of the piece to the powder that composes the charge.

Formerly both theorists and practitioners differed widely from one another in regard to the proper position of it. It has been customary to place it from one quarter of an inch to half an inch from the bottom of the chamber or bore, and sometimes a whole inch. An idea prevailed, that if the vent were directly opposite to the middle of the charge, the powder would be inflamed in less time than in any other place, and that the explosion would of consequence produce a greater initial velocity and range. This erroneous conclusion was founded on the supposition that if a tube were filled with powder and lighted in the centre, the powder would be burnt in half the time that it would if lighted at either end, and on inadvertence to this circumstance, that the inflammation of fired gunpowder is so nearly instantaneous, that no sensible difference as to the time in which it takes place can arise, from the firing of a charge in the centre in preference to any other part of it. In order to determine this point, Frederick the Great, or the Second, of Prussia, ordered a light three pounder to be cast with three shifting vents, one at the centre of the charge, one at the bottom of the bore, and the other at an equal distance from the bottom and centre one; so that when one was used the other two might be stopped up. The gun weighed 2 cwt. 1 qr. 20 lb. Its length was three feet three inches, and the bottom of the bore, instead of being rounded, was quite flat. It was loaded each time with one quarter of the shot's weight of powder. It was found that when the lowest or bottom-vent was used, the ranges were rather the greatest, and that they were somewhat less as the vent was more and more distant from the bottom. The differences, however, were so small, that they might very easily have been produced by the least inaccuracy in making the experiments, or by the gun's being a little more heated at the time of making.

making one than another, and but little reliance can be placed on them.

On the form or figure of the chamber of a piece of ordnance.

The chamber of a gun, mortar, or howitzer, is the cavity at the bottom of the bore, that receives the charge of powder, and communicates with the vent; through which the fire of the priming is communicated to the fame. There are but few guns that have chambers, except some of the largest sizes and calibers, as it has been found by experience, that they have scarce any sensible influence or effect on the velocity of the shot in small and middle sized ones.

Various have been the opinions of authors and artificers respecting the forms or figures of chambers; and different nations have had them constructed very differently. The Spaniards have been in the practice of using chiefly the spherical chamber for their mortars; the French, Germans, and Dutch, the conic, cylindric, and the concave, or bottled, or the *chambre à poire*, or pear chamber. The Portuguese have made use of the parabolic form, which was first suggested or invented by count de Lippe Buckeburg. And the English have been in the habit of making theirs in the form of a frustum of a cone.

The cylindric chamber is that which is equally large every where, or has the diameter of its bore in every place or part of it the same. This is found to be by far the most commodious form for great guns or cannon of a large caliber, and is indeed almost the only kind of chamber that is made use of in such pieces of ordnance.

The spheric, or spherical chamber, as its very name imports, is that which is made in the form of a sphere, or bullet, or at least very nearly so. This sort of chamber for guns, or cannon, was invented towards the close of the seventeenth century. The object of this invention was to throw balls and shot with as much force from short, light, and easily transportable cannon as that with which they were thrown from the long, cumbersome, and ponderous pieces then in use. It was found by experience, that the advantages expected and proposed were obtained by this alteration in the interior arrangement of the bores of guns, or by the construction of such pieces. For though they were made a good deal shorter than those formerly made use of, and were fired with a smaller quantity of powder, they produced the same effects. But as it was difficult to wipe, or clean out the interior cavities of such chambers after the cannon were fired, some fire frequently remained in them, which sometimes occasioned the loss of arms to the cannoniers, or the persons who were employed to serve and manage them. Besides these inconveniences, they were attended with others; for the inflamed powder, before it quitted the chamber, acted in all directions with such force and impetuosity, that their carriages were soon either broken or rendered unserviceable. They recoiled very much and fired with little certainty. For these reasons, guns with spherical chambers were totally laid aside; and such of them as were found in the arsenals and fortresses in France were cast anew into cannon, having cylindric bores every where equal and alike. The guns commonly made use of at present have no chambers, except some of the largest calibers. And even these have their chambers cylindrical.

The very ingenious Mr. Robins in the scholium to the ninth proposition in his new principles of gunnery asserts, that what some authors have advanced in regard to the advantages of having particular forms for the chambers of mortars and cannon, is altogether inconclusive, and founded on erroneous conceptions of the action of fired gun-powder. The learned Mr. Euler, however, in his commentary and remarks on Mr. Robins's treatise, contends for the spherical

chamber as the best. He admits that Mr. Robins's conclusion would be true did the inflammation of the powder take place in an instant. He allows, that the force of the powder on the supposition of its firing instantaneously would be the same, whatever be the form of the space behind the shot or shell that contains it, and whether this space be either wholly or only partly filled with it. He also allows, that its impelling power after the ball or shell is once in motion, will in this case be the same, as well as its first impulsive force, whatever be the form of the chamber; that if no better reason than the increasing of the impelling force can be assigned for changing the figures of chambers, either in guns or mortars, from what they usually are, all proposals for altering them, except such as tend to render them more convenient and commodious, ought to be rejected without further examination.

Leaning, however, towards an opinion of professor Bernoulli, that the elastic force of the fluid generated by the explosion of gunpowder, is nearly ten thousand times greater than the pressure of the atmosphere, he supposes the inflammation of gunpowder to be gradual instead of being almost instantaneous, and therefore concludes, that chambers may be improved by changing their figures, and that the spherical form is the best of any, as being capable of holding the greatest quantity of powder under the same circumference, as better calculated than any other for keeping the grains near, or contiguous to one another, and for quickening, or accelerating the explosion. The experiments which he appeals to, and produces for establishing this hypothesis, are altogether inconclusive, and must have been conducted with great inaccuracy, or inattention to some circumstances that were connected with, and influenced them. They were made in presence of him, Mr. Bernoulli, and several other members of the academy, at St. Petersburg, by general Gunther in 1728. And from two of them he infers, that a ball fired vertically with eight ounces of powder from a piece, which had the length of its cylinder equal to $7\frac{1}{8}$ English feet, issued out of it with thrice the velocity which it issued with, fired with the same quantity of powder from the same piece, when the length of its cylinder was reduced to six feet, by sawing one foot and seven-tenths of a foot off from it. Taking this inference too precipitately for granted, he observes, by way of proving the great inaccuracy of Mr. Robins's position, "that all the powder of the charge is fired and converted into an elastic fluid before the bullet is sensibly moved from its place;" that according to this theory, the velocity instead of being thrice as great would have differed from the other scarce perceptibly, and therefore most erroneously concludes, that the greatest part of the powder must have fired whilst the ball moved through the last foot and a half of the bore of the piece, before it was reduced in length. Now, the quadruplicate ratio of $7\frac{1}{8}$ to 6, or of 77 to 60, is that of 35,153,041 to 12,960,000, which is considerably less than the ratio of three to one. Mr. Euler then makes the velocities of the same, or equal shot fired with the same charge of powder from bores of the same diameter, but of unequal lengths in ratios to one another, respectively greater than the quadruplicate ratios of these lengths. We know, however, from experiments made with incontestable accuracy at Woolwich on Mr. Robins's plan improved, that these velocities are in ratios somewhat less than the subduplicate ratios of the lengths of the bore, but in ratios somewhat greater than the subtriplicate ratios of the same lengths, and nearly indeed in mean or middle ratios between the two. Mr. Euler's making the ratios of these velocities ten times as great as they really are, proves incontrovertibly both his theoretical reasonings, and his experimental

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perimental inferences against the position of the almost instantaneous firing of gunpowder, and in support of the hypothesis of its firing gradually in the way he describes, to be completely erroneous.

The objections he endeavours to draw from rifled pieces against the truth of Mr. Robins's seventh proposition, being inconsistent with facts and experiments, are likewise fallacious and inconclusive.

A conic or conical chamber is that which is in the form of a frustum of a cone, with its bottom sometimes circular, but generally hemispherical, or nearly so. We have been in the habit of using such a form for chambers with the greatest diameter of each at its mouth, or entrance, contrary to reason and principles, which point out the advantage and propriety of having the impulse of the inflamed powder made on the shell or bullet as near to its axis, or to that of the bore of the piece as possible.

Count Buckeburg proposed the parabolic form, or that of a paraboloid, or parabolic conoid, which has been made use of by the Portuguese as the best, erroneously supposing, that were the fire introduced to the focus, the rays of lighted powder would by the nature of the figure be reflected into parallel directions like the rays of light.

A concave chamber is that which has its mouth or entrance narrower than its inside cavity. It may be spherical, spheroidal, in the form of a pear, called by the French, une chambre a poire, in the shape of an egg, of a bottle, and a variety of other forms.

Much more, however, depends on the entrance of the chamber, than on its form or figure. The entrance ought to be directly opposite to the middle of the ball, or shell, and to have no greater width than what is necessary for cleaning out the chamber, which should contain no more powder than the greatest charge proper for service, to prevent as much as possible any vacancies being left between it and the shell or bullet. As the cylindric is the most convenient form for being easily cleaned out, it ought to be preferred to others on account of its simplicity. For, in most of the affairs of life, and more especially in those of war, of all things of the same kind, the simplest are the most commodious.

Of the position of the charge of powder.

Every experiment that has been made respecting the position of the charge of powder, proves the advantage of its lying close to the ball or shell. Among others, the following are well deserving of notice.

The ingenious general Desaguliers in 1753, and Mr. Muller, then professor of fortification in the Royal Military Academy at Woolwich, made a number, repeatedly with a small mortar, which had several shifting chambers.

Into a narrow cylindric chamber of about four inches long, and holding about twelve grains of powder, there was put a thin cartridge filled with six grains. This cartridge was placed in the chamber in such a manner as to lie close to the shell, leaving a vacuity or empty space between it and the bottom of the chamber, and was fired by means of a quick match, introduced through the vent. A cartridge of the same size, and containing the same quantity of powder, was then put into the same chamber, but placed at the bottom of it, leaving an empty space between the powder and the shell, and was fired in like manner. Lastly, an equal cartridge with the same charge of powder was placed in the middle of the same chamber, or equally distant from the bottom thereof and from the shell, and was fired in the same way. These experiments were frequently repeated, and it was found, on every repetition of them, that in the

first case, the shell was thrown nearly twice as far as in the second, and that the distance it went to in the third case, was about an arithmetical mean between its ranges in the first and second.

They also found, that when the same quantity of powder was put loose into the same mortar, and a piece of writing paper laid on it, the shell was thrown considerably farther than it was by the same charge of loose powder without the paper.

They likewise found, that three cylindric shifting chambers of different lengths, but holding the same quantity of powder, produced, when filled, equal ranges, but that when they were not quite filled, the longest gave the greatest range.

They also tried some experiments with two chambers in the form of a frustum of a cone, one of which had its largest diameter at the bottom, and the smallest at the entrance, and the other its smallest diameter at the bottom and the largest at the entrance, and always found, that the first of these with the same charge of powder, threw the shell farther than the second.

General Desaguliers also found by experiments, that grained and mealed powder were about equally strong when in good order and condition; but on putting a small phial filled with water into the chamber amongst the powder, he observed the strength of the charge to be considerably increased.

Of the Windage.

The windage of a gun, mortar, or howitzer, is the difference between the diameter of the bore and the diameter of the shot or shell. We have been in the practice and still are, of making it equal to a twentieth part of the diameter of the shot in every gun except the carronades. The Dutch have commonly made their windage nearly the same as ours. The French have been in the habit of making theirs a twenty-sixth part of the diameter of the shot. And the Prussians make the diameter of the bore of the gun to the diameter of the shot as 25 to 24. This is a most convenient proportion. But it makes the windage much greater than it ought to be. There seems to be no very good reason, indeed, for making the windage bear any given or determinate ratio to the diameter of the shot, since if the bores be true, the same windage that answers for a small shot will be sufficient, or nearly so, for a large one. The smaller the windage, the greater and truer will be the flight of the shot or shells; for when it is great, they are apt to injure the bore by bouncing from side to side, and also, at leaving it, to receive from this kind of motion a sort of cant or deflection from the line of their direction. With our present windage for guns, except carronades, from one fourth to one half of the charge is lost and rendered useless. Short guns, indeed, with small charges of powder and a very small degree of windage will be more useful and serviceable than guns twice as long with double charges of powder and a large windage. We will not undertake to determine precisely what the windage ought to be. But we are inclined to think, that if the shot and shells be cast in moulds having exactly the diameters of the bores of the different pieces of ordnances for which they are intended, the retreat or shrinking of the metal in cooling, will for both leave a sufficiency of windage. The windage we have been in the practice of allowing for shells of all sizes, is a quarter of an inch, which is preposterously large and beyond all due proportion. Were it reduced even to a third or fourth part of that quantity it would be sufficient.

In our common 12 pounder, 18 pounder, 24 pounder, 32 pounder, and 42 pounder, there is allowed respectively a wind-

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a windage of 0.22 inches; 0.252 inches; 0.277 inches; 0.305 inches; and 0.334 inches. But in our 12 pounder, 18 pounder, 24 pounder, 32 pounder, and 42 pounder carronades, the windage is only about 0.097 inches; 0.1 inches; 0.123 inches; 0.145 inches; and 0.166 inches respectively, which gives them a great advantage and saves much powder.

Of the casting and boring of cannon.

The casting of a gun in its strict and limited sense is, the running of any sort of metal or mixture of metals, of which the gun is intended to consist or be composed, into a mould prepared for receiving the same, and having its inside of such a shape, as to form the outside of the gun. But the casting of cannon in its more general acceptation, includes every thing, and operation preparatory to, necessary for, and connected with the founding of them, such as the making of the models, moulds, &c. &c. for all which see the article **FOUNDRY**.

Cannon, as we have already observed, were originally made of bars of iron fitted together lengthwise, or of sheets of iron rolled up and fastened together, and hooped with iron rings. They were ponderous, clumsy, cumbersome, in a great measure unmanageable, and could not be transported from one place to another but with great difficulty and labour. They were chiefly employed for throwing large stones like the machines of the ancients, which they succeeded. These were gradually supplanted by brass cannon, which had much smaller calibers, and threw iron bullets instead of stones, but produced in a few hours greater effects than the others could in many days. These guns were first cast of a mixture of copper and tin, called gun-metal from that circumstance, which continued to be employed for that purpose for a long time before cast iron was made use of. In the course of time, however, as the use of artillery became more general, and the number of cannon greatly increased, iron guns were invented by way of lessening the expence. An idea, however, that prevailed of their being very liable to burst when much heated by firing, retarded the general introduction of them into service, and was the cause of their being made much heavier than brass guns of the same calibers. And this apprehension strengthened by some accidents of the kind that took place either through improper management, or the carelessness and unskillfulness of some founders, has militated against the general use of them even down to the present time. When cast, however, with iron obtained from good virgin ore, to which the founders can give any degree almost of malleability, of which the Carron company and others have afforded many proofs and specimens, they resist bursting as much as brass cannon, and possess great advantages over them, as these are composed of ingredients, that melt with different degrees of heat, and are thereby not only liable to be soon injured when much heated, but also to be rendered in a short time totally unserviceable by quick and continued firing.

Till about 40 years ago, cannons were cast with a cylindrical cavity in each of them, having nearly the same diameter with the intended caliber of the piece, which was afterwards enlarged to the proper size by machines, one of these is represented. See *Cannon*, *fig. 13*. Two cast iron bars, *A A*, were confined in a vertical position, by being screwed to the four beams, *B, B, B, B*; between these bars a cast-iron frame, *CC*, was at liberty to slide; to which frame the gun, *DD*, was fixed by a band, *c*, across the base ring, fixed by two screws, another similar band, *e*, fixed across the chace, and two smaller ones, *aa*, screwed across the trunnions, to prevent the piece from turning round by the action of the drill-

bar, *E*; a tin or copper pan, *F*, was fixed on the drill-bar for containing the chips of metal separated from the piece by the borer on the top of the drill-bar. After the gun was prepared by boring, by cutting off the cap or piece of metal left at the muzzle with a saw, it was brought under the frame, *CC*. The two blocks of pulleys, *G G*, were unhooked from the frame (which was let down and rested on the bottom of the bars *A A*), let down and fastened to the gun below, by chains, to hoist it up into the frame, *CC*, where it was fixed by the screws; the pulleys were then hooked into the top of the frame, to raise it with the gun, high enough to introduce the borer; the pulleys were afterwards slackened, and the drill-bar, which worked in a socket in the ground, set in motion by horses or otherwise, the gun being kept to the work by its own weight; when the gun was bored far enough, it was prevented from descending any farther by the block, *H*, which was adjustable by screws, to the proper length of the bore; when the piece was bored, the pulleys were again used to support it, while it was detached from the frame, and afterwards to lower it down.

Owing to the unequal contraction of the metal between the core and the outside of the mould, guns cast hollow were always more or less spongy, and numberless cavities were formed round the core, some of which were too deep for the borer to cut out; this and other reasons have occasioned the old method to be laid aside, and guns are now universally cast solid. The old machines also, where the gun was fixed, not being found to bore always in the right direction, several new machines have been substituted, some of which are represented in *figs. 14, 15, 16 and 17*.

Fig. 14. is a machine used at the *Garratt Iron Works*. In this, contrary to the former one, the gun, *B*, is turned by the shaft, *A*, moved by a water-wheel; the drill-bar, *E*, is advanced by a weight, *C*, acting on a bent lever, whose fulcrum is *F*; when the weight, *C*, has descended to the floor, or nearly, it must be lifted up, and the point, *G*, then acting as a fulcrum, the rod, *H*, will be drawn forwards, one or two teeth of the rack, *I*, and the weight will be ready to act again as before. The gun, *B*, is fixed by a square lump cast on the end of the calcable, into a coupling box, and wedged up, and the chace of the gun moves in a collar. The only guns cast at these works are carronades.

In *fig. 15*, the gun is fixed in the same manner as *figs. 14 and 17*, except that the box, *K*, is fitted by screws instead of wedges, the drill-bar, *E*, rests on a block, *F*, just before it enters the gun, and the other end is fixed to a carriage, *G*, moving on wheels, *aa*, to diminish friction; to the bottom of the carriage, a rack, *I*, is fixed, working into a pinion, *L*, the rack is kept to the pinion by a roller, *b*; on the end of the axis of the pinion a capstan-head is fixed, with mortise-holes in it, to contain one end of an iron bar, *d*, while the other is loaded with a weight, *C*, for advancing the borer, and is shifted into a fresh hole as often as the weight descends to the ground.

In the machine, *fig. 16*, the muzzle of the gun can be elevated or depressed, to suit guns of different bores, by screws, *c*, between the two plates, *a b*; the plates can also be moved farther from or nearer to the coupling box, by a screw, *d*, to suit guns of different lengths; the two blocks, *F G*, between which the rack, *I*, is fastened, are fixed down to the beams, *A, B*; the pinion, *L*, is fastened to the block, *M*, which can slide between the beams, *A, B*, and has wheels above and below the beams, to diminish the friction; to this block, one end of the drill-bar, *E*, is fixed; near the other, it rests on the block, *F*; on the end of the axis of the pinion is a wheel, *f*, with teeth parallel to its axis, on the end of which axis the bar, *g*, is loosely fitted; to the other end of

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of the bar the weight, *c*, is hung; when the weight is down, the bar must be slid along the axis, far enough to be lifted up clear of the teeth, and is to be pushed back into its place again, above the next tooth.

The machine at the *Royal Arsenal* at Woolwich is shewn in *fig. 17*. The two supports of the gun, *A B*, are of solid brass, and well polished; the drill-bar, *E*, slides on a strong table, with the rack, *I*, at its end, the axis of the pinion, *o*, is upright, and has a wheel, *d*, at its top, working into an endless screw, *e*, which has a wheel, *f*, upon the end of the spindle, with handles on its circumference, for two men to turn it round by; on one of the spokes, *g*, a common handle is fixed, to turn the wheel back, for withdrawing the drill-bar; the pinion, endless screw, and wheel, *d*, are inclosed in a brass box, which supports their axes. We think this machine might be improved, by having the pinion horizontal, and applying a weight to it, as before described in the other machines.

Cannons are always cast with a large cap, or piece of spare metal, at the mouth; in the old guns, which were cast hollow, this piece was cut off by a saw; in the solid guns, at the *Garrat* iron works, it is cut off by a machine, represented in *fig. 20*. On the lathe for turning the outside of the gun, a cast-iron frame, *A A*, is fixed, for supporting steadily the chisel, *b*; between the end of the chisel and the frame, a wedge, *d*, is put in, which a man continually drives with a hammer, to advance the chisel, and turn a notch in the gun; when it is cut about $1\frac{1}{2}$ inch deep, it is broken off by hammers. We think a screw would be judiciously substituted for the wedge.

After cannons are bored, and their outsides turned, the touch-holes are drilled by instruments, *figs. 18* and *19*.; in *fig. 18*. *A A* is a frame of wood, mounted on wheels, *B*, at one end, for convenience of moving when it is to be used; the frame is wheeled close to the gun, *D*, laid on two blocks of wood, *F F*, high enough to take the wheels off the

ground, and prevent its running back; the drill, *E*, and its bow, *G*, are then to be fixed, between the place of the touch-hole of the gun and the block, *H*; which block is advanced by one arm, *I*, of a bent lever, by means of the weight, *C*, hung on the other arm, *d*.

In *fig. 19*. *A* is a beam of the building, through which a screw, *B*, works; the lower end of this screw is hollow for some inches, to receive a small part, *c*, of the drill, *C*; on the lower end of the drill a leaden wheel, *F*, is fixed, to act as a fly; to the upper part, *e*, of the drill, the ends of two strong catguts are fastened, and after being twisted round it a few times, the other ends are tied to a handle, *E E*, at *e* and *f*. To use this machine, a gun is brought and laid under the beam, *A*, the drill set up with the point, *c*, in the end of the screw, *B*, which must be screwed down till the point, *c*, touches the bottom of the hole in the screw, to prevent the point of the drill from slipping away from the intended touch-hole; the workman must then wind up the cords, by turning the wheel, *F*; when the handle, *E*, is in the position of the figure, he must force it down quickly, which will turn the drill round; when the catguts are untwisted, he must let the handle rise, but still hold it, to prevent its turning round with the drill, which will continue to turn by the momentum of the wheel, *F*, and wind the handle, *E*, to the same height as in the figure, but with the cords in a contrary direction. The man must then force the handle down again as before.

Fig. 21. represents the different kinds of borers; *A* is the borer used for solid guns, and *a* a section of the same; *B* and *C* are different views of the borer for boring hollow guns the first time, and *D* and *E* are two different borers for finishing either kind of guns.

The following are the dimensions, both of the iron and brass guns, which the French use at present in their sea and land service, and have made use of ever since their revolution.

Table of the dimensions of French iron cannon for sea service taken parallel to their axes.

[illegible]

Table of the dimensions of French iron cannon for the sea service taken perpendicularly to their axes.

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Table of the dimensions of the French brass cannon for land service taken parallel to their axes.

Dimensions.	Besieging or battering cannon.				Garrison cannon.				Field cannon, 12, 8, and 4 pounds.												Cannon for light troops.					
	24 Pounder.				16 Pounder.				12 Pounder.				8 Pounder.				4 Pounder.				1 Pounder.					
	Feet.	Inches.	Lines.	Points.	Fract.	Feet.	Inches.	Lines.	Points.	Fract.	Feet.	Inches.	Lines.	Points.	Fract.	Feet.	Inches.	Lines.	Points.	Fract.	Feet.	Inches.	Lines.	Points.	Fract.	
a	0	8	5	5	0	7	4	5	0	6	9	0	5	10	6	0	0	3	8	0	0	2	10	10	0	
b	0	0	2	9	0	0	2	5	0	0	2	2	0	0	1	11	0	0	6	0	0	0	0	11	0	
c	0	2	4	6	0	0	0	3	0	0	1	10	4	0	7	7	0	0	0	0	0	0	9	9	0	
d	0	1	10	8	0	1	7	9	0	0	1	5	11	0	3	10	0	0	5	0	0	0	7	10	0	
e	0	0	0	5	0	0	0	4	0	0	0	6	8	0	0	8	0	0	4	0	0	0	2	11	0	
f	0	0	2	9	0	0	0	2	0	0	0	2	2	0	0	11	0	0	1	6	0	0	0	11	0	
g	0	0	4	2	0	0	0	3	0	0	0	3	4	0	0	2	0	0	6	0	0	0	1	5	0	
h	0	0	9	6	0	0	6	11	0	0	6	2	0	0	4	5	0	0	0	0	0	0	5	10	0	
i	0	0	10	11	0	0	7	0	0	0	7	0	0	0	8	3	0	0	6	0	0	0	3	10	0	
k	0	0	1	11	0	0	1	2	0	0	1	1	5	0	11	9	0	0	9	0	0	0	5	10	0	
l	0	1	3	2	0	0	6	7	0	0	1	2	0	0	4	9	0	0	9	0	0	0	7	3	1	
m	0	1	7	7	0	2	0	1	0	1	1	1	8	0	1	9	0	0	8	0	0	0	9	7	3	
n	2	0	7	11	0	0	1	9	0	1	1	1	5	0	11	9	0	0	7	9	0	0	5	10	0	
o	0	1	2	1	0	0	1	0	0	0	1	2	0	0	0	9	0	0	6	2	0	0	4	10	0	
p	0	9	0	4	0	0	3	0	0	0	2	0	0	0	8	3	0	0	1	7	0	0	2	11	0	
q	0	5	5	4	0	0	4	2	0	0	4	9	0	0	10	0	0	0	3	0	0	0	1	9	0	
r	0	1	5	0	0	0	1	0	0	0	4	1	0	0	3	1	0	0	1	0	0	0	0	9	0	
s	0	5	5	0	0	0	4	3	0	0	4	9	0	0	10	0	0	0	3	0	0	0	0	9	0	
t	0	1	2	1	0	0	1	0	0	0	1	2	0	0	0	9	0	0	1	0	0	0	0	9	0	
u	0	0	9	6	0	0	9	7	0	0	10	3	0	0	7	10	0	0	10	0	0	0	0	2	0	
v	0	1	3	0	0	0	4	0	0	11	2	0	0	0	9	9	0	0	6	2	0	0	4	10	0	
x	0	0	11	3	0	0	9	10	0	0	8	11	0	0	7	10	0	0	6	2	0	0	3	11	0	
y	4	2	11	10	0	4	4	4	0	4	0	0	1	3	7	8	0	2	4	6	5	1	6	7	1	
z	0	0	2	9	0	0	2	5	0	0	2	2	0	0	1	11	0	0	1	6	0	0	0	11	0	
a'	0	0	11	3	0	0	9	10	0	0	8	11	0	0	7	10	0	0	6	2	0	0	3	11	0	
b'	0	0	2	9	0	0	2	5	0	0	2	2	0	0	1	11	0	0	1	6	0	0	0	11	0	
c'	0	10	7	5	0	9	3	6	0	8	5	4	0	7	4	6	0	0	7	6	0	2	9	9	0	
d'	0	0	2	9	0	0	2	5	0	0	2	2	0	0	1	11	0	0	1	6	0	0	0	11	0	
e'	0	0	8	5	0	0	7	4	0	0	6	8	0	0	5	10	0	0	4	7	0	0	2	11	0	
f'	10	10	5	8	0	10	4	8	0	9	9	1	5	0	8	9	5	4	0	7	0	7	1	0	0	
a' f'	the total length	10	10	5	8	0	10	4	8	0	9	9	1	5	0	8	9	5	4	0	7	0	7	1	0	0

CANNON.

A Table of the dimensions of French brass cannon for land service, taken perpendicular to their axes.

Dimensions.	Besieging or battering cannon.				Garrison cannon.				Field cannon, 12, 8, and 4 Pounds.				Cannon for light troops.			
	24 Pounder.		16 Pounder.		12 Pounder.		8 Pounder.		12 Pounder.		8 Pounder.		4 Pounder.		1 Pounder.	
	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.	Feet.	Inches.
	Points.	Lines.	Points.	Lines.	Points.	Lines.	Points.	Lines.	Points.	Lines.	Points.	Lines.	Points.	Lines.	Points.	Lines.
a a	0	5	0	4	0	4	0	3	0	4	0	3	0	3	0	1
b b	0	3	0	2	0	2	0	2	0	2	0	2	0	2	0	1
c c	0	6	0	4	0	4	0	4	0	5	0	4	0	3	0	1
d d	1	6	0	3	1	3	0	2	1	5	0	2	1	2	0	1
e e	1	6	0	3	1	3	0	2	1	5	0	2	1	2	0	1
f f	1	5	0	3	1	3	0	2	1	5	0	2	1	2	0	1
g g	1	4	0	2	1	2	0	1	1	4	0	2	1	2	0	1
h h	0	2	0	1	0	1	0	1	0	2	0	1	0	1	0	0
i i	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
k k	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
l l	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m m	0	2	0	1	0	1	0	1	0	2	0	1	0	1	0	0
n n	0	5	0	4	0	4	0	3	0	5	0	4	0	3	0	1
o o	0	10	0	6	0	6	0	5	0	10	0	6	0	5	0	1
p p	1	3	0	2	1	2	0	1	1	4	0	3	0	2	0	1
q q	1	3	0	2	1	2	0	1	1	4	0	3	0	2	0	1
r r	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
s s	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
t t	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
u u	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
x x	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
y y	2	1	0	1	1	1	0	1	0	3	0	2	0	1	0	0
z z	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
a' a'	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
b' b'	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
c' c'	1	2	0	1	1	1	0	1	0	3	0	2	0	1	0	0
d' d'	1	1	0	1	1	1	0	1	0	3	0	2	0	1	0	0
e' e'	1	1	0	1	1	1	0	1	0	3	0	2	0	1	0	0
f' f'	0	10	0	6	0	6	0	5	0	10	0	6	0	5	0	1
g' g'	0	10	0	6	0	6	0	5	0	10	0	6	0	5	0	1
h' h'	0	11	0	6	0	6	0	5	0	11	0	6	0	5	0	1
i' i'	0	10	0	6	0	6	0	5	0	10	0	6	0	5	0	1
k' k'	0	10	0	6	0	6	0	5	0	10	0	6	0	5	0	1
l' l'	2	0	10	0	11	0	10	0	11	0	10	0	11	0	10	0
m' m'	1	0	0	4	0	0	4	0	0	4	0	0	4	0	0	4
n' n'	0	10	0	6	0	6	0	5	0	10	0	6	0	5	0	1
o' o'	0	5	0	4	0	4	0	3	0	5	0	4	0	3	0	1
Weight of Cannon and Maffelotte	5628 lb.		4111 lb.		3184 lb.		2175 lb.		1808 lb.		1186 lb.		590 lb.		266 lb.	
	3100 lb.		2600 lb.		1800 lb.		1200 lb.		1235 lb.		950 lb.		550 lb.		250 lb.	

Canon a l'Espagnole, or a Spanish cannon, is one, that has a chamber at the bottom of the bore in the form of a sphere or a little flattened.

Canon a la Suedoise, or a Swedish cannon, is a piece, that carries a four pound ball, and weighs about 600 lbs.

Canon de Campagne ou de bataille, field or battle-cannon, are pieces that are employed in the field with armies.

The composition and proportions of the ingredients made use of in casting brass cannon, are nearly the same in the different nations in Europe. Founders have affected to keep this composition a secret: it is, however, well known: and if it were not, it would be a secret not worth keeping. For none of them have been able to find out a composition for such guns, as will enable them to stand quick and continued firing, or a hot engagement, without either melting or becoming useless. They are not so well calculated for severe and hard services as good iron guns, that are both lighter and more transportable.

The common proportion of the copper to the tin in gun-metal, is that of 100 to 12. Some founders put to 240 lbs. of metal fit for casting 68 lbs. of copper, 52 lbs. of brass, and 12 lbs. of tin. The Germans put to 4200 lbs. of metal fit for casting, 3687 $\frac{3}{4}$ lbs. of copper, 204 $\frac{1}{2}$ lbs. of brass, and 307 $\frac{3}{4}$ lbs. of tin. Some use 100 lbs. of copper, 6 lbs. of brass, and 9 lbs. of tin; and others 100 lbs. of copper, 10 lbs. of brass, and 15 lbs. of tin. In short, different founders are guided in their proportions of these materials, by their own whims and fancies. See COPPER.

The French make use of mortars, that have their calibers, or the diameters of their bores, each equal to eight inches, three lines of their measure. These mortars have cylindric chambers, each of which contains 1 $\frac{3}{4}$ lbs. of powder. Such a mortar weighs 500 lbs.

They have also mortars of twelve inches diameter with cylindric chambers, each of which contains five pounds and a half of powder. Such a mortar weighs 1450 lbs.

They have likewise mortars of twelve inches caliber, or diameters with chambers *a poire*, or pear chambers; each of which holds, in like manner, five pounds and a half of powder. Such a mortar weighs 1700 lbs.

They use also mortars of twelve inches caliber, or diameter with pear chambers, each of which holds twelve pounds of powder. Such a mortar weighs 2300 lbs.

Besides these, they have some of six inches diameter, and some of eighteen inches diameter or caliber.

They likewise use stone mortars, or mortars for throwing stones of fifteen inches diameter, with chambers in the form of truncated cones, each of which holds two pounds and a half of powder. Such a mortar weighs 1000 lbs.

CANNON, *ship*, are stronger in metal than those used by land, on account of the necessity they are often under of being charged with chain-shot. They lie on ship-carriages, having four small wheels, without spokes, with two ropes to stop their running back, and bring them again to their place upon the battery.

CANNON of *course*, or *Chace*-CANNON, in a galley, is the largest, middlemost, and most effective of the guns placed in the prow, or chace of the vessel, and which delivers its shot over the very item, generally carrying a shot of 33 or 34 pounds weight. It is a long piece, and recoils all along the middle of the galley to the mast.

CANNON-mouth of a *bit*, in the *Manege*, denotes a round, long piece of iron, sometimes composed of two pieces coupled together and bent in the middle. Cannon-mouths are contrived to keep a horse in subjection, being so ordered that they rise gradually toward the middle and ascend toward

the palate, that the void space left underneath may afford a liberty to the tongue. See BIT.

CANNONADE. To cannonade any object either by sea or land is to discharge or fire cannon at it. A cannonade may take place between fleets, shipping, armies, &c. It may be made by ships against ships, towns, works, batteries; or by batteries, works, towns, against ships, &c. A cannonade may take place between two armies, either occupying field positions, or drawn up in order of battle for the purpose of engaging. An army standing on the defensive may keep up a heavy cannonade on the enemy advancing to attack them. The besiegers may cannonade the works of the besieged, and the besieged may cannonade the approaches and batteries thrown up by the besiegers.

CANNONEER, or CANNONIER, a person who is employed in the management, or in the working and firing of cannon. It is a term sometimes made use of to denote an artillery-man, a gunner, and sometimes an artillery officer. Thus, *maître canonier* signifies an officer of artillery, whose duty it is to attend to the pointing, loading, and firing of the cannon in his charge.

CANNULA, in *Surgery*, is a hollow instrument, usually cylindrical, and made of metal; employed for the transference of any fluid out of the body, or for the conveyance of some remedial application to an interior organ. For example, the ancients resorted to such an instrument, to defend the adjacent parts, on several occasions, when they applied a hot iron so as to act as a cautery, (See CAUTERY); and the moderns employ a cannula to draw off pus or dropical accumulation from within a large cavity, (see DROPSY, and TROCAR): but the use of a cannula for keeping open deep wounds is very problematical; or rather, it is now generally rejected, as being hurtful in many cases, and needless in all.

CANNULA, or CANOLA, in *Ecclesiastical Writers*, was a tube of silver, or other metal, wherein were put the relics, which the pope sent as presents to princes, &c.

CANNULA, or CANOLA, was also a sort of siphon, through which they anciently sucked the wine in the eucharist.

CANO, ALONSO, in *Biography*, called the Michael Angelo of Spain, from his excelling in the three arts of painting, sculpture, and architecture, was born in 1600 at the city of Grenada. Having studied the principles of architecture under his father, an eminent architect of his native city, he directed his attention to sculpture, as a disciple of Pacheco of Seville, and he afterwards applied himself to the art of painting in the academy of Juan del Castillo the painter, in the same city. Besides many fine pieces which he executed for the public edifices of Seville, he also practised sculpture, and made two colossal figures of St. Peter and St. Paul of such peculiar excellence, that the Flemish artists are said to have visited Seville in order to have an opportunity of copying them. Claiming noble birth, and possessing a high spirit, his first productions were gratuitous. In consequence of a quarrel with Sebastian de Llanos, an eminent painter; which terminated in a duel, he was obliged to quit Seville; and in the suite of the count-duke Olivares, as well as under his protection, he went to Madrid, where he was soon appointed first royal architect, king's painter, and instructor to the prince, Don Balthazar Carlos. In this situation he acquired distinguished reputation as an architect, sculptor, and painter. His fame, however, excited jealousy and envy, and he was charged with plagiarism in the composition of his pieces. But another circumstance occurred, which was much more injurious to his prosperity. Upon his returning home one evening, he found his wife murdered and his house pillaged,

and an Italian journeyman missing. The magistrates, discovering that Cano had been jealous of this Italian, and that he was attached to another woman, charged him with the murder; and he was reduced to the necessity of making a speedy escape. He fled for refuge to Valencia, but was soon betrayed by the practice of his art; and he then sought an asylum in a Carthusian convent near that city; and being deterred from taking the order by the dread of its austerities, he returned to Madrid, where he was apprehended and delivered to the torture in order to extort a confession. Having endured the rack without self-crimination, he was again taken into favour by the king; and with a view to his future security, he obtained the clerical office of residentiary of Grenada. In this situation he enriched the churches of Grenada and Malaga with many paintings and sculptures. But having been refused the payment of 100 pistoles by a counsellor of Grenada for an image of St. Anthony of Padua, he dashed the faint in pieces on the floor of his academy. This fall of passion induced the chapter of Grenada to suspend him from his function; but he was restored by the king, on the condition of finishing a magnificent crucifix, which the king had bespoken, but which he had long neglected. From this time he led a life of charity and devotion; and when destitute of money, he supplied the wants of a beggar by sketching a drawing upon paper, and directing him how to dispose of it. The violence of his temper was still unsubdued; and even in his last moments he could not be prevailed upon to make use of a crucifix which was presented to him for adoration, because it was such a wretched piece of work, that he could not bear the sight of it. Cano died at the age of 76, in the year 1676. Cumberland's *Annals of Eminent Painters in Spain*. Gen. Biog.

CANO, or CANUS, JOHN SEBASTIAN DEL, a native of Biscay, who accompanied Magellan in his voyage through the straits, bearing his name, and who, after his death, took the command and proceeded to the isles of Sunda. Thence doubling the cape of Good Hope, he arrived at Seville in 1522, having performed the voyage round the world in three years and four months. Charles V. gave him for a device a terrestrial globe, with this legend, "Primus me circumdedisti," i. e. thou first hast surrounded me. Moreri. Gen. Biog.

CANO, or CANUS, MELCHIOR, a Spanish theologian, was a native of Tarancon in the diocese of Toledo. Having studied at Salamanca under Francis Victoria, and entered into the order of St. Dominic, he succeeded his preceptor in the theological chair in 1546. Between Cano and Bartholomew Caranza, archbishop of Toledo, who was also at the same time professor at Salamanca, there subsisted a jealousy, which produced two parties in the university. But Cano was superior to his rival in the powers of his genius and the extent of his learning, as well as in the vivacity of his temper and the readiness of his eloquence. Paul III. deputed him to attend the council of Trent, and in 1552 he was made bishop of the Canary islands. He was distinguished, by the favour of king Philip II. and of his unfortunate son, Don Carlos, and it is said that he sacrificed the interest of the latter to that of the former. He is also charged with having attempted to persuade the king that he might lawfully make war against any sovereign, in the assertion of his own rights; but in advancing this principle, he offended the court of Rome. Such were his ambitious views, that he resigned his bishopric in order to be near the court; but he could not long indulge them, as he died at Toledo in 1560, soon after he was appointed provincial of Castile. His work entitled "*Locorum Theologicorum lib. xii.*" in which he explains the principles or sources (for that is the sense in which he uses the term *loci*) whence arguments may be deduced for

the confirmation of doctrines and opinions, is highly commended by Du Pin. Whilst he maintains the authority of the church of Rome, and the infallibility of the pope, he introduces many liberal sentiments, and it appears that he gave little credit to the legends and forgeries of corrupt ages. We have some bold and generous remarks to this purpose, cited by Dr. Jortin, in his "*Remarks on Ecclesiastical History*," vol. ii. p. 316—319. Cano's Latin style is good. Besides the work already mentioned, he also wrote "*On the Sacraments*," and "*Six Lectures concerning Penance*." Du Pin. Moreri.

CANO, or GHANA, in *Geography*. See GHANA.

CANO, a river of Finland, which passes by Biorneborg.

CANOA, a town of Japan, in the province of Iwami.

CANOBO, a town of Italy, in the Milanese, on the west side of the lake Maggiore; 13 miles E.S.E. of Domo d'Ossello. N. Lat. 45° 55'. E. long. 8° 47'.

CANOE ISLAND, an island so called by Mr. Mackenzie in his voyage through the N.W. continent of America; situate in about N. lat. 53° 31'. W. long. 122° 48'.

CANOE-ridge, a rugged mountain of America, about 200 miles W. of Philadelphia, forming the eastern boundary of the Bald Eagle valley.

CANOE, in *Sea Language*, a small vessel used by various inhabitants of the earth for the purpose of fishing, of trading, and travelling along rivers, and of war. Canoes are made of different materials, such as the trunk of a tree, the bark of trees, skins of animals, &c. Canoes used on the American, or other rivers, in consequence of the curved form of their transverse section, carry their lading higher than square-sectioned boats of similar width; and are therefore capable of conveying large hogsheds of tobacco, or of other articles, with safety.

CANOE of the *aborigines of Canada*, is made of the bark of the birch; and some are of a size sufficient to contain four or five persons.

CANOE of the *Esquimaux*, is made of whalebone, about an inch square; these are not set like ribs, but are from stem to stern fast sewed to each other with strong sinews, and covered over with seal skins. They are from ten to twenty feet long, and about two feet broad; they are formed like a weaver's shuttle, sharp at both ends, so that they can be rowed either way. In the middle of the canoe are the ribs, both to keep the sides asunder, and to form the hole in the covering wherein the rower sits. A flat hoop is fitted to this hole, rising about four inches, to which the surrounding skin is sewed. The Indian's seal-skin jacket, being of a proper length, he can occasionally bend the skirt of it round the outside of this hoop; by which means, he keeps the canoe free from water, and is enabled to procure his game far from the land, or in stormy seas. His paddle is from six to ten feet long, being light, and flat at each end: this serves him to balance and steer his canoe, but particularly to row it, which he does with that incredible celerity, that an English boat with ten oars is not able to keep company with the canoe. The young men in their exercise are taught to over-set their canoes, and when the bottom is upward, to recover by the dextrous management of their paddle, their former upright position, the men rising again either on the side by which they went down, or on the contrary, as they please. The construction of this extraordinary little vessel, so admirably well adapted to the purposes of its owner, does the greatest credit to the ingenuity of the constructors. There is a canoe of this description in the repository of the Royal Society, and another in the library of the marischal college, Aberdeen.

CANOE of *Davis Straights*, is in the form of a barge, seven

or eight feet long, and two in breadth; the materials made use of are pliant, bent and interlaced like an hurdle, and covered with the skins of sea dogs, or wolves. This light boat carries only one man, who, seated in a hole formed in the middle of what, from this circumstance, appears to be a deck, is enabled to fish, or to transport himself with facility, and without much apparent danger, from one coast to another.

CANOE of the coast of Guinea, is made by hollowing the trunk of a tree; it is of a long figure, and swims with only a small part of its body above the surface of the water; so that the person who sits behind, and guides the canoe, is frequently half covered with water. The breadth is no more than sufficient to contain one man, and the length for seven or eight. The men are seated on round pieces of wood, and half their bodies are below the gunwale. Each man has an oar of a very hard wood, and all row together, like galley-men, in one concordant motion; or, if an individual pulls too strongly, putting the canoe out of its line, his mistake is so well counteracted by the man that guides in the stern, that the whole seems to fly along the surface of the water, and cannot be long followed by any European vessel. When, on the other hand, the sea is high, they are unable to steer, the loftiness of the waves preventing their answering the helm. When the surf oversets them, they have the address to turn their canoe in the water, to empty it, and reembark, without running the smallest danger, swimming all the time like fish. These canoes are generally about sixteen feet long, and one or two broad: there are, however, some much larger, measuring thirty five feet in length, five in breadth, and three in depth; they are flat at the stern, with a rudder and deck; the sails are made of reeds, or of grass. The canoes are not allowed to remain in the water, but are drawn on shore, and placed on four trellises; when dry, two men can carry a canoe on their shoulders. In shaping and hollowing the trunks they have felled, the negroes now make use of the hatchets that are sold to them by the Europeans. They narrow them towards the bottom, and cut each end to a point, giving it a small beak of about a foot long, and of a thickness adapted to the hand, for the purpose of lifting the canoe.

CANOE of the Indian and Charibbee, is the simple trunk of a tree, hewn on the outside to the desired form, and hollowed within by means of fire. Its size consequently depends upon that of the tree of which it is made. It is rowed with paddles and oars, and sometimes has the assistance of a little sail. The lading is placed at the bottom, but as the canoe is not ballasted, it frequently oversets. The aftermost oars supply the purpose of a rudder.

CANOE of Nootka Sound. The large war canoe is generally finished on the spot where the tree grows of which it is made, and then dragged to the water-side. Some of them have been seen which were fifty three feet in length, and eight feet in breadth. The middle part of these canoes is the broadest, and gradually narrows to a point at each end; but their head or prow is generally much higher than the stern. As their bottoms are rounded, and their sides flared out, they have consequently sufficient bearing, and a considerable degree of stability. They have no seats, but several pieces of wood, about three inches in diameter, are fixed across them to keep their sides firm, and preserve them from being warped. The rowers generally sit on their hams, but sometimes they make use of a kind of small stool, which is a great relief to them. In the act of embarking they are extremely cautious, each man regularly taking the station to which he has been accustomed. Some of these canoes are polished and painted, or curiously studded with human teeth, particularly on the stern and prow. This is affirmed

on the authority of captain Cook, who says that the people of the sea coast adorned their canoes with human teeth. But Mr. Mackenzie (*Journal of a Voyage through the N.W. Continent of America*, p. 335.) informs us, that he was particular in his inquiries, and that he obtained the most satisfactory proof that captain Cook was mistaken; and that his mistake arose from the great resemblance there is between human teeth and those of the sea otter, with which the gunwale, fore and aft, of a canoe, which he examined, was inlaid. The sides were sometimes adorned with the figure of a dragon with a long tail, of much the same form as is seen on the porcelain of China, and in the fanciful paintings of other countries.

CANOE of Russia, employed on the lake of Wolda, is rounded at both ends; it is much wider in the middle than at either end, and is worked with a single oar, which is placed at the stern: but all the other canoes of that country terminating sharply both ways, are elevated before as well as behind. They are hardened by means of fire, protected from the weather by paint, and lashed round for the purpose of giving them additional strength.

CANOE of Terra-del-Fuego and the Straights of Magellan, is of a peculiar construction. The natives take the bark of the largest trees, and bend it into a shape with so much skill, that the vessels have a resemblance to the gondolas of Venice. For this purpose they place it on a small piece of wood, as Europeans place a ship on the stocks; and when the bark has taken the gondola form, and the necessary bend, they line the bottom and sides, from one end to the other, with upright pieces of their wood, in the same manner as the parts or frames of a ship are put together: round the top of the deck another bandage of bark is drawn, in doing which, the utmost care is taken to fasten the whole together. These canoes are from ten to sixteen feet in length, and two in breadth; holding with sufficient convenience, seven or eight men, who row standing, and with extreme celerity. See also the articles *BOAT*, *PROA*, &c.

CANOGE, or CANOUGE, in *Geography*, a town of Hindoostan, seated on the right bank of the Ganges, near the place where the Calini or Callynuddi river joins it. Its ruins are even now of great extent, and in an early part of the Christian æra, it was the capital of Hindoostan, or rather of the principal kingdom along the Ganges, and is possibly the place meant by Pliny for Calinipaxa. It is at present reduced to the size of a middling town. It is said to have been built more than 1000 years before our æra; and is mentioned in Ferishta (326 years B. C.) as the capital of all Hindoostan, under the predecessor of Phooos, or Porus, who fought against Alexander. Canoge corresponds, with regard to extent and magnificence, to the description given of Palibothra, and in some respects, to the local position assigned to it by Ptolemy and Eratosthenes; but other authorities assign this place to Patna. The Indian histories abound with the accounts of its grandeur, and populousness. Its walls are said to have been 100 miles in circumference, and its third emperor, Sinkal, could bring into the field 400 elephants, 100,000 horse, and 400,000 foot. In the sixth century it was found to contain 30,000 shops, in which betel nut was sold, 3000 jewellers, and 60,000 bands of musicians, who paid a tax to government. In the year 1018 it was seized by the Gaznian emperors, at which time it gave its name to the kingdom, of which it was the capital. It is distant from Agra 127 miles; from Benares 259; from Bombay 889; from Calcutta by Moorshedabad 824, by Birboon 719; from Delhi 214; from Lucknow 75; from Madras 1141; from Nagpour 486; from Ougein 464; and from Poonah 842. N. lat. 27° 3'. E. long. 80° 13'.

CANON, in *Ecclesiastical History*, a person who possesses a prebend or revenue allotted for the performance of divine service, in a cathedral, or collegiate church.

Canons are of no great antiquity: Paschier observes, that the name canon was not known before Charlemagne; at least the first we hear of are in Gregory de Tours, who mentions a college of canons, instituted by Baldwin XVI. archbishop of that city, in the time of Clotharius I. The common opinion attributes the institution of this order to Chrodegangus, bishop of Metz, about the middle of the eighth century.

Originally canons were only priests, or inferior ecclesiastics, who lived in community; residing by the cathedral church to assist the bishop; depending entirely on his will; supported by the revenues of the bishopric; and living in the same house, as his domestics or counsellors, &c. They even inherited his moveables till the year 817, when this was prohibited by the council of Aix-la-Chapelle, and a new rule substituted in the place of that which had been appointed by Chrodegangus, and which was observed for the most part in the west till the twelfth century. By degrees these communities of priests, shaking off their dependence, formed separate bodies; whereof the bishops, however, were still heads. In the tenth century there were communities, or congregations of the same kind, established even in cities where there were no bishops: these were called collegiate, and as they used the terms congregation and college indifferently: the name chapter, now given to these bodies, being much more modern. Under the second race of the French kings, the canonical, or collegiate life, had spread itself all over the country; and each cathedral had its chapter, distinct from the rest of the clergy.

They had the name canon from the Greek *κάνων*, which signifies three different things; a rule, a pension, or fixed revenue to live on, and a catalogue or matricula; all which are applicable to them.

In time, the canons freed themselves from their rules, the observance relaxed, and at length they ceased to live in community; yet they still formed bodies; pretending no other functions besides the celebration of the common office in the church; yet assuming the rights of the rest of the clergy; making themselves as a necessary council of the bishop; taking upon them the administration of a see during a vacancy, and the election of a bishop to supply it. There are even some chapters exempt from the jurisdiction of the bishop, and owning no head but their dean. After the example of cathedral chapters, collegiate ones also continued to form bodies, after they had abandoned living in community.

Canons are of various kinds; as,

CANONS, *cardinal*, or those attached, and as the Latins call it, *incardinati* to a church, as a priest is to a parish.

CANONS, *domicellary*, were young canons, who not being in orders, had no right in any particular chapters.

CANONS, *expectative*, were such as, without having any revenue or prebend, had the title and dignities of canons, a voice in the chapter, and a place in the choir, till such time as a prebend should fall.

CANONS, *foreign*, were such as did not officiate in the canons to which they belonged.—To these were opposed *mansionary canons*, or *canons residentiary*.

CANONS, *lay* or *honorary*, are such among the laity, as have been admitted, out of honour and respect, into some chapter of canons.

CANONS *regular*, are canons that still live in community; and who, like religious, have, in process of time, to the practice of their rules, added the solemn profession of vows.

They are called *regulars*, to distinguish them from those

secular canons who abandon living in community, and at the same time, the observance of the canons made as the rule of the clergy, for the maintenance of the ancient discipline.

The canons subsisted in their simplicity till the eleventh, some say the twelfth century, when some of them, separating from the community, took with them the name of canons, or acephalous priests, because they declined to live in community with the bishop; and those who were left, thenceforth acquired the denomination of canons regular, and adopted most of the professions of the rule of St. Augustine. This order of regular canons of St. Augustine was brought into England by Adelwald, confessor to Henry I. who erected a priory at Nostel in Yorkshire, and obtained for them the church of Carlisle as an episcopal see, with the privilege of choosing their own bishop. They were singularly protected and encouraged by Henry I. who gave them the priory of Dunstable in 1107, and by queen Maud, who in the following year, gave them the priory of the Holy Trinity in London. It appears, that under the reign of Edward I. they had fifty-three priories.

CANONS, *tertiary*, those who had only the third part of the revenues of the canonicate.

CANON, in an *Ecclesiastical Sense*, is a law or rule, either of doctrine or discipline, enacted especially by a council, and confirmed by the authority of the sovereign.

Canons are properly decisions of matters of religion; or regulations of the polity and discipline of a church, made by councils either general, national, or provincial. See COUNCIL.

Such are the canons of the council of Nice, or Trent, &c. See CONSTITUTIONS.

There have been various collections of the canons of the Eastern councils; but four principal ones, each ampler than the preceding. The first, according to Usher, A. D. 380, containing only those of the first œcumenical council, and the first provincial ones: they were but 164 in number. To these, Dionysius Exiguus, in the year 520, added the fifty canons of the apostles, and those of the other general councils. The Greek canons in this second collection, end with those of the council of Chalcedon; to which are subjoined those of the council of Sardica, and the African councils. The fourth and last collection comes down as low as the second council of Nice; and it is on this that Balsamon and Zonaras have commented. See Hardouin's *Acta Conciliorum et Epistolæ decretales ac Constitutiones Summorum Pontificum*, in 11 tomes; commencing with the year 34, and terminating in 1714. Prol. Paris, 1715.

CANONS, *Apostolical*, are those which have been usually ascribed to St. Clement, in order to procure for them a high degree of authority. They contain a view of the church government and discipline received among the Greek and oriental Christians in the second and third centuries. Bellarmine, Baronius, &c. will have them to be genuine canons of the apostles. Cotelierius observes, (Jud. de Canon. Ap. ap. Patr. Ap. t. 1.) that they cannot be ascribed to the apostles or Clement, because they are not received with other books of Scripture, are not quoted by the writers of the first ages, and contain many things not agreeable to the apostolical times. Hincmar, De Marca, Beveridge, &c. take them to be framed by the bishops who were the disciples of the apostles in the end of the second and beginning of the third centuries. Beveridge (Cod. Can. Vindicat. l. i. c. x. 4.) acknowledges that they are interpolated in several places, though he professes a great veneration for them, and has undertaken to defend them. The bishop ascribes a kind of apostolical authority to the 50th canon, which requires of the bishops and presbyters that they should make use of a three-fold immersion in baptism, under pain of being deposed. The 69th canon strict-

ly requires the observation of the quadragesimal fast, under spiritual pains and penalties; and this, together with other stated fasts, Beveridge supposes to have been of apostolical institution. S. Bafnage is of opinion, that they were collected by an anonymous writer in the fifth century; but Daille, &c. maintain them to have been forged by some heretic in the sixth century; and S. Bafnage conjectures, that some of them are ancient, and others not older than the seventh century. The 85th canon contains a catalogue of the books of the Old and New Testament; which, from the books of the New Testament, that are enumerated in it, could not have been drawn up till after the third century. The epistle to the Hebrews was rejected, or doubted of by many in the first three centuries, and also in the fourth century; but if this canon had been then in being, and acknowledged as apostolical, that epistle would have been received by all. Several of the catholic epistles, that of James, the second of Peter, the second and third of John, and that of Jude, were rejected, or doubted of by many in the early times of Christianity; whereas they would have been received by all, if this canon had been in being, or had been acknowledged to be apostolical. This argument is urged by Mill, in his "Prolegomena," p. 201. Moreover, the Revelation was received by many in the second, and third, and following centuries, which would not have been the case, if there had been a canon composed by the apostles, or Clement their companion, in which all other books of Scripture were distinctly enumerated, and that omitted. How, says Baronius to this purpose, could so many of the Latin and Greek writers receive the Revelation, which was wanting in an apostolical canon? And how could there have been such different opinions about the epistle to the Hebrews, and several of the catholic epistles, if they had been made canonical by an apostolical decree? Besides, the first epistle of Clement was reckoned canonical by very few, if any of the writers of the first three centuries; therefore this pretended apostolical canon, which gives it a place among books of sacred Scripture, was not in being; and the second epistle of Clement was not esteemed his in the third century, though the catalogue of this canon includes it. The Greek church allows only 85 of these canons, and the Latins only 50; though there are 84 in the edition given of them in the "Corpus Juris canonici." See Lardner's works, vol. iv. p. 354., and Jortin's Rem. on Eccles. Hist. vol. i. p. 278. &c. Cave, Hist. Lit. vol. i. p. 29. Jones's New and Full Method of settling the Canonical Authority of the New Testament, vol. i. p. 25.

CANON, is also used for the authorized catalogue of the sacred writings. The word is originally Greek, *κανων*, and signifies a rule or standard, by which other things are to be examined and judged. Accordingly the same word has been applied to the "tongue of a balance," or that small part, which, by its perpendicular position, determines the even poize or weight, or, by its inclination either way, the uneven poize of the things which are weighed. To this purpose is the observation of the ancient scholiast of Aristophanes in Ran. v. 809. Hence it appears, that as the writings of the prophets, apostles, and evangelists contain an authentic account of the revealed will of God, they are the rule of the belief, and practice of those who receive them.

Canon seems also sometimes to be equivalent to a list or catalogue, in which are inserted those books, that contain the rule of faith. Hence Du Pin, and others, have supposed, that these books are called canonical, because they are placed in the catalogue of sacred books. It has been said, however, that the Greek word is never used in this sense, by any prophane writers, nor even among the Christians, till the fourth century; before which time the word was certainly applied to the sacred

volume. Mr. Whiston (Essay on the Apostolical Constit. chap. i. §. 6.) imagines the canon of Scripture, or the canonical books of the Old and New Testament, to be those, and only those, which are inserted in the last apostolical canon, and that they were so filed by the ancients only on that account. But as the spurioufness of these pretended apostolical canons is very generally allowed, it is needless to refute this opinion. See *Apostolical CANONS*.

The use of this appellation, as applicable to the books of Scripture, is undoubtedly very ancient. St. Paul has twice used the word canon, or rule. Gal. vi. 16. Philip, iii. 16. And though in these passages he may refer to the doctrine of the gospel in general, or to some particular maxim of it, and not to any books containing the rule of faith, yet his use of the word may have given occasion for fixing that denomination to the books of Scripture. Irenæus, speaking of the Scriptures, (Adv. Hæres. l. iv. c. 69.) files them *τον κανωνα της αληθειας*, i. e. the canon of truth; and here canon is not a catalogue, but the books, or the doctrine contained in the books of Scripture. Clement of Alexandria, (Strom. l. 4. p. 453.) disputing with some heretics of his time, blames them for making use of apocryphal Scriptures, "chusing to follow any thing, rather than the true evangelical canon (or the canon of the gospel)." In another place (Strom. l. vi. p. 676.) he says, "the ecclesiastical canon is the consent and agreement of the law and the prophets with the Testament delivered by the Lord." Eusebius (Hist. Eccles. l. vi. c. 25.) tells us, that Origen, in his exposition on Matthew, enumerates the books of Scripture according to the canon of the church; i. e. the canon received and established in the church. Athanasius, in his Festal epistle, mentions three sorts of books, the canonical, which are those now received by us, such as were allowed to be read, and such as are apocryphal, by which he means books forged by heretics. In the Synopsis of Scripture, which some have ascribed to him, but probably not written till 100 years after his time, near the end of the fifth century, there occurs frequent mention of canonical and uncanonical books. The council of Laodicea, about 363, ordains, that "no books, not canonical, should be read in the church, but only the canonical books of the Old and New Testament." The third council of Carthage, about 397, ordains, "that nothing beside the canonical Scriptures be read in the church under the name of Divine Scriptures." Epiphanius, Philastrius, Rufinus, Jerome, Augustine, Chrysostom, Isidore of Pelusium, and Leontius of Constantinople, use the words canon and canonical in the same sense. Hence we may infer, how much the use of these words, canon and canonical, has obtained among Christians, to denote those books, which are of the highest authority, and the rule of faith; as opposed to all others whatever, particularly to ecclesiastical, or the writings of orthodox and learned catholics; and to apocryphal, the productions, chiefly of heretics, which by a specious name and title made a pretension to be accounted among sacred books. The most common and general division of the canonical books is that of ancient and new, or the Old and New Testament.

The canon of the Old Testament is much more easily settled than that of the New; because whatever almost may be objected against the authority of the present canon of the former, either in behalf of any books which are not in it, or against any that are, may be answered by this single consideration, viz. that we receive the same and no other books than such as were received by the Jewish church in the time of our Saviour, as is evident from the copies of them procured by the Christians, and the catalogues they made of them soon after the destruction of Jerusalem. Some differ-

ence, however, has occurred in the mode of their arrangement. Hody says (*de Bib. Text. Orig.* l. ii. c. 9. p. 190.) that the division of the sacred books into the Law, the Prophets, and Chetubhim, or Hagiographa, is of the highest antiquity. The Jews are said by some, but as others think, without sufficient evidence, to have ascribed it to the prophet Ezra. Although the Jewish people have been very uniform in the number of sacred books received by them, they have varied, and have been somewhat arbitrary, in the general denominations and divisions of them. Isaac Vossius suspects that the above mentioned division, was an invention of Aquila, who, in the second century, made a new version of the Jewish scriptures into Greek; whereas, the old partition was that of the Law, the Prophecies, and Psalms. Dr. Lardner observes, that no traces of it appear in the Scriptures of the Old or New Testament, nor in Josephus, nor in Philo, nor in any Christian writers before Epiphanius and Jerom, near the end of the fourth century. Some, indeed, have supposed that this tripartite division is referred to in Luke, xxiv. 44; but other learned and judicious persons, as Leusden and Wolfius, are of opinion that by the "Psalms" in this place we are not to understand the metrical books, or any other general division of the scriptures of the Old Testament, but the book of Psalms. J. Fr. Buddeus, (*Hilt. Eccles. Vet. Test.* tom. posterior, p. 828, 4to. Halæ Magdeb. 1719.) cited by Lardner, says it is uncertain when and by whom this partition was first used; and he also shews the impropriety and inconvenience of it, as generally used by the Jews. It does not appear that any notice is taken of it, or regard had to it in Melito, Origen, Cyril, or Athanasius. Among those who have used this partition, there seems to have been a great variety of opinions concerning the books that should be called "Hagiographa." The term has nothing in it appropriating and distinctive, and this may have been the ground of that difference of opinion among those who have used it, concerning the books that should be placed in this class. Every other partition of the sacred books of the Old Testament, with which we are acquainted, seems, in the judgment of Dr. Lardner, to be preferable to this of the Law, Prophets, and Hagiographa. Those denominations, which we sometimes meet with in the New Testament, the "Law," or "the Prophets," denoting in general the ancient sacred writings, are very just. The dichotomy, "the Law and the Prophets," so common in the New Testament, is very proper. The tripartite division in Luke, xxiv. and Josephus, "the Law, the Prophets, and Psalms or Hymns," is also very proper. Another partition is that used by Cyril of Jerusalem, viz. legal, historical, metrical, and prophetic, which seems to have been regarded by Athanasius, Origen, and Melito, in their catalogues, appears to Lardner and others the most proper and commodious.

Some have placed the books of the Old Testament from the first to the last, in chronological order. This, however, is a matter of no importance, and might be found inconvenient. But if they are divided into classes, the order of time may be useful. Accordingly, in the first class, must be the five books of Moses; then the historical books, Joshua, Judges with Ruth, Samuel, the Kings, the Chronicles, Ezra, Nehemiah, Esther; next the metrical books, Job, the Psalms, the Proverbs, Ecclesiastes, the Canticles; lastly, the prophetic books, the twelve prophets in one book, each of which might be placed, according to the order of time, Isaiah, Jeremiah with the Lamentations, Ezekiel, Daniel; or, first of all, the four larger prophets, and then the book of the twelve lesser prophets, as they are called: by which we perceive, that the present order of books in

our Bibles is, in the main, such as we have reason to be well satisfied with.

The first catalogue of the books of the Old Testament recorded by any Christian writer is that of Melito, bishop of Sardis, in Lydia, who is placed by Cave at the year 170. He travelled into Palestine on purpose to learn the number of these books. Eusebius has preserved his catalogue, and he says, that it is a catalogue of the scriptures of the Old Testament universally acknowledged. It contains the books received by the Jews into their canon; but he does not mention the book of Esther. The order in which he enumerates them is as follows, viz. five books of Moses, Joshua, Judges, Ruth, four books of the Kings, two books of Chronicles, the Psalms of David, the Proverbs of Solomon, the Ecclesiastes, the Canticles, Job, the books of the Prophets Isaiah, Jeremiah, the 12 Prophets in one book, Daniel, Ezekiel, Ezra. Origen, about 230, has a catalogue, in which the books occur in the following order, viz. five books of Moses, Joshua, Judges with Ruth, one book; the first and second book of the Kings, called by them Samuel, and reckoned one book; the third and fourth of the Kings, also one book; the first and second of the Remains, in one book; Esdras, first and second, in one book, called by them Ezra; the book of the Psalms; Solomon's Proverbs, Ecclesiastes, Canticles, Isaiah, Jeremiah, Daniel, Ezekiel, Job, Esther. The book of the Twelve Prophets is wanting in our copies. Athanasius, in his Festal Epistle, and also in the Synopsis Scripturæ, ascribed to him, enumerates the books in this order, viz. first, the five books of Moses; then the historical books, from Joshua to Ezra; then, the books in verse, the Psalms, Proverbs, Ecclesiastes, Canticles, Job; lastly, the Prophets, which are the Twelve Prophets in one book, Isaiah, Jeremiah, Ezekiel, and Daniel. Cyril of Jerusalem, about 348, has a catalogue, in which he uses divisions. The first are the five books of Moses; then the historical books; after them, five books in verse, Job, the Psalms, the Proverbs, Ecclesiastes, the Canticles; and, last of all, five prophetic books, which are the Twelve Prophets, in one book, Isaiah, Jeremiah, Ezekiel, Daniel. Epiphanius, about 368, has three catalogues; in two of which all the books of the Old Testament are enumerated from Genesis to Ezra or Esther, without any partitions. But in the other he divides them, observing, that the books of scripture are comprised in four Pentateuchs, and two over and above the first Pentateuch, or that which is most properly so, containing the five books of the Law: the next contains the five books in verse, the book of Job, the Psalter, the Proverbs of Solomon, the Ecclesiastes, the Canticles: the third Pentateuch contains those called Graphica, by others Hagiographa, which are the book of Joshua, the book of Judges with Ruth, the first and second of the Remains, the first and second of the Kingdoms, and the third and fourth of the Kingdoms: the fourth Pentateuch consists of the Twelve Prophets, in one book, Isaiah, Jeremiah, Ezekiel, Daniel; the two others, over and above these, are the two books of Ezra, reckoned one book, and Esther. This catalogue is followed by John Damascenus, about the year 830. Jerom, A. D. 392, enumerates 22 books of the old law, according to the number of the Hebrew letters; viz. five books of Moses, viz. Genesis, Exodus, Leviticus, Numbers, and Deuteronomy; eight of the prophets, viz. Joshua, Judges with Ruth, Samuel, Kings, Isaiah, Jeremiah, Ezekiel, and the Twelve Prophets; and nine of the Hagiographa, viz. Job, David or the Psalms, Solomon comprehending three books, i. e. Proverbs, Ecclesiastes, and the Song of Songs; Daniel, Chronicles, Ezra, and Esther. Hence we see, that St.

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Jerom's canon of the Old Testament was that of the Jews. All other books not received by them, he calls Apocryphal. See APOCRYPHAL.

In the catalogue of Rufinus, about the year 397, the books of the Old Testament are enumerated in the following order; viz. in the first place, are the five books of Moses, Genesis, Exodus, Leviticus, Numbers, Deuteronomy. After these are Joshua and Judges, together with Ruth. Next the four books of the Kingdoms, which the Hebrews reckon two; the book of the Remains, which is called the Chronicles, and two books of Ezra, which by them are reckoned one, and Esther. The prophets are Isaiah, Jeremiah, Ezekiel, and Daniel; and besides, one book of the Twelve Prophets: Job also, and the Psalms of David. Solomon has left three books to the churches, the Proverbs, Ecclesiastes, and the Song of Songs. In the third, otherwise called the sixth, council of Carthage, assembled in 397, it was ordained, that nothing beside the canonical scriptures should be read in the church under the name of Divine Scriptures; and that the canonical scriptures are these, Genesis, Exodus, Leviticus, Numbers, Deuteronomy, Joshua, Judges, Ruth, four books of the Kingdoms, two books of the Remains, Job, David's Psalter, five books of Solomon, the books of the twelve prophets, Isaiah, Jeremiah, Ezekiel, Daniel, Tobit, Judith, Esther, two books of Ezra, and two books of the Maccabees. Upon this canon it has been remarked, that this council was not general, but provincial, or national; that the bishops assembled do not shew much learning or judgment, when they reckon five books of Solomon; that the decree of this council, by placing among canonical scriptures Tobit, Judith, and the two books of the Maccabees, contradicts antiquity, or ought to be explained with a distinction; the word canonical being used laxly, so as to comprehend not only those books which are admitted as the rule of faith, but those also which are esteemed useful, and may be publicly read for the edification of the people: and that this council mentions only two books of Ezra, meaning, probably, the book of Ezra properly so called, and the book of Nehemiah; but nothing is said of the other two, sometimes called the third and fourth books of Ezra. According to Augustine, (*De Doctrin. Christ. l. ii. c. 8. tom. iii. p. i. Bened.*) about 397, the entire canon of scripture is the following books, which he thus enumerates. There are five of Moses, that is, Genesis, Exodus, Leviticus, Numbers, Deuteronomy; one book of Joshua; one of the Judges; one small book called Ruth, which seems rather to belong to the beginning of the Kingdoms; then the four books of the Kingdoms, and two of the Remains, not following one another, but proceeding, as it were, parallel on the side of each other. These are historical books, which contain a succession of times in the order of events. There are others which do not observe the order of time, and are unconnected together: as Job, Tobit, Esther and Judith, and the two books of the Maccabees, and the two books of Esdras; which last do more observe the order of a regular succession of things, after that contained in the Kingdoms and Remains. Next are the Prophets; among which is one book of the Psalms of David, and three of Solomon, the Proverbs, the Song of Songs, and Ecclesiastes. For those two books, Wisdom and Ecclesiasticus, are called Solomon's for no other reason but because they have a resemblance with his writings; for it is a very general opinion, that they were written by Jesus, the son of Sirach: which books, however, since they are admitted into authority, are to be reckoned among prophetic books. The rest are the books of those who are properly called prophets: as the several books of the twelve prophets, which, being

joined together and never separated, are reckoned one book. The names of which prophets are these; Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habbakkuk, Zephaniah, Haggai, Zechariah, Malachi. After them are the four prophets of larger volumes; Isaiah, Jeremiah, Daniel, Ezekiel. In these 44 books is comprised all the authority of the Old Testament.

From this extract it appears, that there was not then any canon of scripture settled by any authority, that was universally acknowledged by christians. Though there might be decrees of councils relating to this matter, they were not esteemed decisive and of authority, every where, and by all. But still private and inquisitive christians had a right to use their own judgment concerning this point. Although Augustine says, that Wisdom and Ecclesiasticus ought to be reckoned among prophetic books, &c.; yet Rufinus and Ierom, who were a little older, must be allowed to bear a right testimony, and to declare truly what was the sentiment of most christian churches, when they say, that "the Wisdom of Solomon, Ecclesiasticus, Tobit, Judith, and the Maccabees, were indeed allowed to be publicly read: but that nevertheless they were not canonical, and that no doctrine of religion may be proved by their authority." From other passages in the works of Augustine it appears, that he acknowledged only 3 books of Solomon to be his; the Proverbs, Ecclesiastes, and Canticles; and that the Jews have no more of his writings in their canon. With regard to the books of Wisdom and Ecclesiasticus, he observes, that though they were esteemed by some, on account of some resemblance of style and design, to be Solomon's, the learned are satisfied they are not his; and that they were chiefly respected by the Western christians. He particularly owns that the book of Judith was not in the Jewish canon. Augustine, indeed, often quotes those books of the Old Testament which we now generally call apocryphal, as Wisdom, Tobit, Ecclesiasticus, and the Maccabees; but he frequently uses expressions which shew they were not esteemed the books of the prophets, or of equal authority with the books of the Jewish canon. In his "Retractions" (l. i. c. 20,) he owns his mistake in quoting the book of Ecclesiasticus as prophetic; when it was not certain that it was written by a prophet. He also says in another place, (l. ii. c. 20) that he had not any proof of some propositions which he had advanced, but from the book of Wisdom, which the Jews did not receive as of canonical authority. In another work written about the year 420, he says, "The Jews do not receive the scripture of the Maccabees as they do the Law, and the Prophets, and the Psalms, to which our Lord bears testimony, Luke xxiv. so that upon the whole, Augustine seems not to differ from Jerom and Rufinus. For the testimonies of other ancient writers, Chrysostom, Theodoret, Cosmas of Alexandria, Gregory bishop of Rome, Leontius, &c. to the Jewish canon, we must refer to Lardner, *ubi infra*. In the Stichometry of Nicephorus, patriarch of Constantinople, who flourished in the beginning of the ninth century, we have a catalogue of the books both of the Old and New Testament. The divine scriptures mentioned in this work as received by the church and reckoned canonical, are; Genesis, Exodus, Leviticus, Numbers, Deuteronomy, Joshua, Judges, and Ruth, the first and second books of the Kingdoms, the third and fourth of the Kingdoms, the first and second of the Remains, Ezra, first and second, the book of Psalms, the Proverbs of Solomon, Ecclesiastes, the Song of Songs, Job, Isaiah the prophet, Jeremiah the prophet, Baruch, Ezekiel, Daniel, and the 12 prophets. All together, it is said, the books of the Old Testament are 22. The contradicted books are, three books of the Maccabees, the Wisdom of Solomon, the

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Wisdom of Jesus, the Son of Sirach, Psalms, and Odes of Solomon, Esther, Judith, Susanna, and Tobit, called also Tobias. The insertion of the book of Baruch, among the sacred scriptures of the Old Testament, is the only circumstance in which this catalogue differs from that of the Jews; but this, and the omission of Esther, which was not in all ancient catalogues, may be reckoned things of no great consequence. In the Stichometry prefixed by Cotelierus to the apostolical constitutions there are 60 books of the Old and New Testament, among which are placed 3 books only, which we call Solomon's, the Proverbs, Ecclesiastes, and the Canticles; the other two, sometimes ascribed to him, Wisdom and Ecclesiasticus, are placed with those, which are not of the 60, or contradicted books. Among the 60 there is but one book of Ezra, probably meaning our Ezra and Nehemiah; but among the apocryphal is a book called the Revelation of Ezra. The book of Esther is not placed among the 60, but in the second class of such as were reckoned useful. See BIBLE.

The canonical books of the New Testament, received by christians in this part of the world, are the Four Gospels, the Acts of the Apostles, 14 Epistles of St. Paul, seven catholic Epistles, and the Revelation. Dr. Lardner suggests, that the best canon of the New Testament, is that which may be collected from Eusebius of Cæsarea, and which seems to have been the canon of some in his time. The canon should consist of two classes: the *first* consisting of those books, called *ὁμολογούμενα*, which he assures us were then universally acknowledged, and had been uniformly received, by all catholic christians; these are the four gospels, the Acts of the Apostles, 13 epistles of St. Paul, one epistle of St. Peter, and one epistle of St. John. These only should be esteemed of the highest authority, from which doctrines of religion may be proved. The *second* class comprehends those books of which Eusebius speaks, called *ἀντιλεγόμενα*, as contradicted in his time, though well known; concerning which there were doubts, whether they were written by persons whose names they bear, or whether the writers were the Apostles of Christ. These are the epistle to the Hebrews, the epistle of James, the second of Peter, the second and third of John, the epistle of Jude, and the Revelation. These should be reckoned doubtful, and contradicted; though many might be of opinion, that there is great reason to believe them genuine. They should be allowed to be publicly read in christian assemblies, for the edification of the people; but not to be alleged, as affording, alone, sufficient proof of any doctrine. Eusebius reckons a *third* class of books of the New Testament, called *ᾠδα*, spurious; but Dr. Lardner observes, that there should be no such third class of sacred books; forasmuch as there appears not any reason from christian antiquity to allow of that character and denomination to any christian writings, beside those above-mentioned. This canon is a good one, because it is short, and contains only those books, which were acknowledged by all in the time of Eusebius, and from the beginning; and seven others, which were then well known, and are next in esteem to those that were universally acknowledged; and were generally received as of more authority than any other controverted writings. Nor is there in them any thing inconsistent with the facts, or the principles delivered in the books, universally acknowledged. Moreover, there may be a great deal of reason to think, that they are the genuine writings of those, to whom they are ascribed, and that the writers were Apostles. No other books, beside those now generally received by us, ought to be esteemed canonical, or books of authority. The books contained in this canon, were written by several persons, in several places,

and at different times; and it is, therefore, reasonable to think, that it was formed gradually. At the rise of the christian religion, there were no written systems or records of it; nor, indeed, was it fit, that any books should be written about it, till there were converts to receive and keep them, and deliver them to others. In process of time, the writings of the apostles and evangelists would be respectfully received by christian profelytes, as the written word of God, or sacred Scriptures. Those who received them would embrace the opportunities that occurred of conveying them to others; and those who received them were fully assured of their genuineness by those who delivered them. Before the end of the first century, or, indeed, not very long after the middle of it, it is likely, there were collections made of the four gospels, and of most of the other books of the New Testament, which were in the hands of a considerable number of individuals and of churches. From quotations of some and from the writings of Irenæus, Clement of Alexandria, Tertullian, and other writers of the second century, of Origen in the third, and of Eusebius in the fourth century, it appears, that most of the books, now received by us, and called canonical, were universally acknowledged in their times, and had been so acknowledged by the elders and churches of former times. And as to the rest, now received by us, though they were then doubted of, or controverted by some, they were well known, and approved by many. Athanasius also, who lived not long after Eusebius, (having flourished from the year 326, and afterwards), received all the same books, which are now received by us, and no others. This has been the prevailing sentiment ever since. This canon was not determined by the authority of councils; but the books of which it consists were known to be the genuine writings of the apostles and evangelists, in the same manner that we know the works of Cæsar, Cicero, Virgil, Horace, Tacitus, to be theirs. And the canon has been formed upon the ground of an unanimous, or generally concurring testimony and tradition.

That the number of books to be received as sacred and canonical had not been determined by the authority of any council or councils, universally acknowledged, is apparent from the different judgments among Christians, in several parts of the world, concerning divine books, particularly the Epistle to the Hebrews and the Revelation; which were received by some, rejected, or doubted of by others. This was also the case with respect to some of the catholic epistles. No such authority had settled the canon of the New Testament in the time of Eusebius, because he mentions no such thing. There was no catalogue of the books of Scripture in any canon of the council of Nice, A. D. 325. Augustine, A. D. 397, giving directions to inquisitive persons, how they might determine what books are canonical, and what not, does not refer to the decisions of any councils. Cassiodorus, in the sixth century, has three catalogues, one called Jerom's, another Augustine's, and another that of the ancient version; but without reference to the decree of any council, as decisive. And it seems most probable, that in all times, Christian people and churches had a liberty of judging for themselves according to evidence; which evidence, with regard to the genuineness of most of the books of the New Testament, has been so clear and manifest, that they have been universally received. The genuineness of these books was determined by testimony, or tradition. The first testimony is that of those who were cotemporary with the writers of them; and this testimony has been transmitted by others. That the primitive Christians formed their judgment concerning the books of Scripture in this way, appears from their remaining works.

works. Instances to this purpose might be collected from Clement of Alexandria, Tertullian, Origen, Eusebius, Athanasius, Cyril, Rufinus, and Augustine. But, besides observing the testimony of writers in former times, they also criticized the books that were proposed to them; examining their style and contents, and comparing them with those books which had been already received, as genuine, upon the ground of an unanimous testimony, and undoubted tradition. Some indeed have said, that the council of Laodicea, held probably A. D. 363, first settled the canon of the New Testament. But it may be justly said to have been settled before. At least, says Dr. Lardner, there had been long before a general agreement among Christians, what books were canonical and what not. From the decree of the council itself it appears, that there were writings already known by the title of canonical. That council, in its last canon, merely declares, "that private psalms ought not to be read in the church, nor any books not canonical, but only the canonical books of the Old and New Testament;" after which follows a catalogue or enumeration of such books, in which are rejected the apocryphal books of the Old Testament, and the Revelation in the New Testament. The 47th canon of the council of Carthage, assembled A. D. 397, ordains, "that nothing besides the canonical Scriptures be read in the church, under the name of divine Scriptures." This council's canon of the New Testament is the same as that now received, without any other later writings as canonical; though from the manner in which the Epistle to the Hebrews is mentioned, there is reason to suspect, that it was not so generally received as the other 13 epistles of St. Paul. "We nowhere read," says Le Clerc (H. E. ann. 100. num. iii. iv. et ann. 29. num. xcii.) "of a council of the apostles, or of any assembly of the governors of Christian churches, convened to determine by their authority, that such a number of gospels, neither more nor fewer, should be received. Nor was there any need of it, since it is well known to all from the concurring testimony of contemporaries, that these four gospels are the genuine writings of those whose names they bear; and since it is also manifest that there is in them nothing unworthy of those to whom they are ascribed, nor any thing at all contrary to the revelation of the Old Testament, nor to right reason. There was no need of a synod of grammarians, to declare magisterially what are the works of Cicero, or Virgil. In like manner, the authority of the gospels has been established by general and perpetual consent, without any decree of the governors of the church. We may say the same of the apostolical epistles, which owe all their authority, not to the decisions of any ecclesiastical assembly, but to the concurring testimony of all Christians, and the things themselves which are contained therein." Upon the whole, we may conclude, that the writings of the apostles and evangelists are received, as the works of other eminent men of antiquity are, upon the ground of general consent and testimony; nor does the canon of the Scriptures of the New Testament owe its establishment to the decisions of councils, but to the judgment of Christian people in general; and the judgment is right and reasonable.

If we refer to the writings of ancient authors, we shall find, that they had the same canon of the New Testament with that which is generally received in our times. Accordingly, the catalogue of canonical books furnished by Origen about A. D. 230; Eusebius, A. D. 315; Athanasius, A. D. 326; Cyril, A. D. 348; (the book of Revelation excepted); Epiphanius, A. D. 368; Basil and Gregory Nazianzen, and Amphilochius, A. D. 370; Gregory Nyssen, A. D. 371; Jerom, A. D. 392; Augustine, A. D. 395; Rufinus, A. D.

397; Innocent I. bishop of Rome, A. D. 402; Isidore of Pelusium, and Cyril of Alexandria, A. D. 412; Cassian, A. D. 424; Prosper of Aquitaine, and Eusebius, bishop of Lyons, and Sedulius, A. D. 434; Leo, bishop of Rome, and Salvian, presbyter of Marseilles, A. D. 440; Dionysius, falsely called the Areopagite, A. D. 490; Gelasius, bishop of Rome, A. D. 494; Andrew, bishop of Caesarea, A. D. 500; Facundus, an African bishop, and Arethas, A. D. 540; Cassiodorus, A. D. 556; Photius, patriarch of Constantinople, A. D. 858; Oecumenius, A. D. 950; Theophylact, A. D. 1070; (the Revelations excepted); and Nicephorus Callisti, A. D. 1325; agrees with that which is now received among Christians. We learn from Paul Sarpi's history of the council of Trent, that one of the doctrinal articles concerning Sacred Scripture, extracted, or pretended to be extracted out of Luther's works, was this: "that no books should be reckoned a part of the Old Testament besides those received by the Jews: and that out of the New Testament should be excluded the Epistle to the Hebrews, the Epistle of James, the second of Peter, the second and third of John, the Epistle of Jude, and the Revelation." And in that council there were some bishops "who would have had the books of the New Testament divided into two classes; in one of which should be inserted those books only which had been always received without contradiction; and in the other, those which had been rejected by some, or about which at least there had been doubts." Dr. Courayer, in his notes, seems to favour this proposal. See his French translation of the history of the council of Trent, (l. ii. c. 43. tom. i. p. 235, and c. 47. p. 240. note 1.). Concerning the difference of opinions that have subsisted among ancient and modern writers, with respect to the authenticity of particular books, their authors, &c. see the titles of those books, Hebrews, Peter, John, James, Jude, and Revelation, or Apocalypse. For the time of writing the several books of the New Testament, and other particulars relating to them, see their respective titles. See also GOSPEL, ACTS, EPISTLE, and TESTAMENT. Those who wish to examine this subject more at large, may consult, besides the well-known writings of Cosin, Richardson, Nye, Jones, Lardner, Michaelis, Kennicott, &c. "Gerhardi de Maltricht Canon Scripturæ sacræ ecclesiasticus," Jenæ, 1725; "Schmidii Historia antiqua et Vindicatio Canonis sacri V. et N. T." Lipsiæ, 1775, and "Stofchii Commentatio Historico-critica de Librorum N. T. Canone," Francof. ad Viadrum, 1755. Such persons as are acquainted with German literature will find much new and curious information in Dr. Semler's "Freye Untersuchung," or Free Inquiry into the Canon, 3 vols. 12mo. Halle, 1771—1773; Weber's "Beyträge zur Geschichte des Kanons," Tübingen, 1791, and in Eichhorn's "Repertorium," vol. v. p. 217.

Some of the fathers have distinguished the inspired writings into three classes: proto-canonical, deuterocanonical, and apocryphal; which see respectively.

CANON, *pascchal*, a table of the moveable feasts, shewing the day of Easter, and the other feasts depending on it, for a cycle of nineteen years. The pascchal canon is supposed to be the calculation of Eusebius of Caesarea, and to have been done by order of the council of Nice.

CANON, in *Monastic Orders*, a book wherein the religious of every convent have a fair transcript of the rules of their order, frequently read among them as their local statutes. This is also called *regula*, as containing the rule and institution of their order. The canon differs from the missale, martyrologium, and necrologium.

CANON, again, is used for the catalogue of saints acknowledged and canonized in the Roman church.

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CANON is also used, by way of excellence, in the Romish church, for the secret words of the mass, from the preface to the *Pater*; in the middle of which the priest consecrates the host. The common opinion is, that the canon of the mass commences with *Te igitur*, &c. The people are to be on their knees, hearing the canon; and are to rehearse it to themselves, so as not to be heard.

CANON, in *Music*, from κανων, *regula*, a rule or law. In speaking of harmonics, in the division of the monochord, it implies the ratio of sounds, or the proportion of sound to sound, when a string is divided by moveable bridges into harmonic intervals. Hence Euclid's celebrated tract on harmonics, as well as Ptolemy's, is called *sectio canonis*, the section of the canon.

But, in musical composition, a *canon* is a law given by one part to another, or to several parts. As nothing is more difficult to compose than *canons*, so no species of composition has exercised ingenuity, meditation, and labour, in more various ways than the construction of *canons*.

In the unison and octave, they are not only more easy to compose, but are more pleasing to hear; as all other *canons* are moving in two or three different keys at the same time. But *canons* that are easy to write, and pleasing to hear, are in no estimation among masters and profound contrapuntists. They have no more respect for a *canon* in the unison and octave, than a geometrician for a sum in addition; they regard *canons* as musical problems, of which, if the solution is easy, they are unworthy of notice. They are, in reality, more calculated to exercise intellect, than delight the auricular sense.

Canons in the 5th or 4th obtain the most reverence; but these fervile imitations have been practised in the 2d, 3d, 6th, and even the 9th. But rigid fuguists call these only *imitations*, as the intervals are not similar.

Canons were the last compositions which masters condescended to publish in score. They were regarded as enigmas, which required the deepest sagacity and science to unfold. All the several parts were written on one staff, frequently without specifying when, where, and in what interval the other parts came in. Sometimes, indeed, the composer was so indulgent as to place this character, \S , over the first note of each of the other parts; but without indicating at what distance from the *propolla*, or subject, or whether above or below it. At other times the performers were told what kind of *canon* it was, and how resolved by a Greek or Latin term; that is, on what found the *risposta*, or answer, was to be made. If in the 4th, 5th, 8th, &c. the words *diateffaron*, *diapente*, *diapason*, &c. occur. If these terms are used simply and unaccompanied, they generally imply that the answer is made in such interval above; but if some expletive is not added to the interval in which the answer is made, the performer is uncertain whether it is above or below the text or subject proposed.

Padre Martini says (*Saggio di Contrappunto*) that there are so many *canons* still preserved of the old ecclesiastical composers, each of which is upon some peculiar construction, that it would require a long treatise even superficially to explain them.

A *canon* that is written and composed in a mysterious and singular manner, is called by the Italians *canone chiuso*; a *canon*, in score, or clearly explained, *canone aperto*. A *canon* written only on one line, and seemingly in one part or melody, sometimes has its solution pointed out by different clefs and rests at the beginning. In old composers, whether the *risposta* is made above or below the subject, is often determined by the Latin particle, *super*, or *sub*, or by the Greek *hyper*, or *hypo*. So many of the most ancient *canons* are

locked up in the mystery of enigmatical inscriptions or mottoes, that the good Padre Martini has collected and explained between 50 and 60 of these oracular decrees: such as

1. *Clama ne cesses.*
2. *Ocia dant vitia.*
3. *Dii faciant sine me non moriar ego.*
4. *Omnia si perdas famam servare memento,
Qua semel amissa, postea nullus eris.*
5. *Sperari & proolari multos facit morari.*
6. *Ocia securis insidiosa nocent.*
7. *Tarda solet magnis rebus inesse fides.*
8. *Fuge morulas.*

Each of these enigmas implies, that the parts which answer the leader, are to pay no attention to the rests, but to sing the notes without them.

The 12 next enigmas imply nothing more than that the first of the two answers begins with the first note of the subject proposed, and advances straight forward to the end; while the second answer begins at the end, and moves backward to the beginning.

It is easy enough (says M. Ginguené) to conceive the difficulty of constructing such *canons*, and how impossible it is to divine the author's meaning, if some written clue is not given to it; but it is not so easy to conceive what pleasure can result from the execution of such a task, or the merit of taking such great pains for so little pleasure.

Dr. Pepuch was very fond of these musical mysteries; and the studious and profound Padre Martini, to the end of his life, apologised for, and strongly recommended the cultivation of them, to young musicians, as stimuli to meditation and the study of recondite harmony. A close canon is placed at the head of each chapter of his History of Music, and whatever contempt and aversion modern fashionable composers may affect for these pedantries, no musician is willing to confess his ignorance of any part of the arcana of counterpoint, or to have it thought that he is *incapable* of making a canon; for the regular bred and deep harmonists of Italy and Germany still respect the old Roman school, and are not only pleased with a good fugue or canon, when they hear or see it, but add to the number whenever their science and leisure allow it.

Marpurg defines *canon*, "a musical composition, in which the parts are dispersed according to the rules of imitation."

In the ancient manner of writing all the several parts on one staff, the solutions were pointed out by a *presa*, or sign of reference, \S , or by numbers, indicating when the several parts come in, placed above or below the five lines, to point out which were above and which below the principal, and sometimes by the mere title of the *canon*, as *ad diateffaron*, &c.

Besides *canon* in equal intervals and notes of equal value, there are others of augmentation and diminution; that is, when the subject is repeated by the 2d part in notes of double or of half the length of the first. There are *canons* likewise in *moto contrario*, *per arsin et thesin*, which see.

Canons in different species of octave, which all must be, except those in the unison, octave, 4th and 5th, are only *imitations* (which see), though the parts move in the same kind of notes.

There are also *canons* on two, three, and four subjects, difficult to construct, and still more difficult for the hearer to comprehend; they are purely calculated to entertain the eye, but not the ear; as there is too much confusion for that sense to distinguish and follow the several melodies, or enjoy the ingenuity of the design. Geminiani has in a concerto of his op. 3ra. a movement in *canon* of four parts, unisons, and octaves, which used to be admired; but he had another in his

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last concertos, op. 7ma. on four different subjects, which we believe was never performed in public, it produced so much confusion in private.

To give a list of the principal writers on fugue and *canon* would be enumerating all the authors who have written on music from the 15th century to the present. The rules have been varied but little from Pietro Aron's time, though new contrivances and new enigmas have been multiplied without end.

Composition in plain and florid counterpoint should be studied, and its rules and exceptions well digested by a musical student, before he attaches himself to fugue and *canon*, which will make him indifferent about *melody*, provided, under *canonical* restrictions, he can make his *harmony* correct.

All that now remains for us to do, in order to smooth the way in this kind of study when the young composer thinks it expedient to undertake it, is to give a few short specimens of the principal kinds of *canon* that have been cultivated by great masters of the old school, when nothing else was prized, and all their powers were devoted to that almost exclusively.

No writer has more clearly laid down the rules of fugue and *canon* than Dr. Pepusch, as no one was more deeply read than he was in all the arcana of that kind of lore. Marpurge, Padre Martini, Kirnberger, and subsequent writers, may have somewhat extended and detailed the rules more minutely than the venerable graduate of one of our universities; but as far as he goes, we may safely depend on his doctrines. Concerning *canon*, his precepts are few and short; but of fugues, both precepts and examples are not only numerous, but luminous and indisputable, which rendered it less necessary to be diffuse on *canon*, as the laws of fugue are the laws of *canon*, with respect to bringing in the answers of the several parts; and all the short examples of *fugue* in Dr. Pepusch's treatise are almost wholly in *canon*.

After fully treating of regular fugue, and its laws, he says: "Regular *fugues* are of two sorts; the one is called by the Italians, *Fuga legata*, and the other *fuga sciolta*. The first sort is in English generally called *canon*, and we may express the other by the name of *free fugue*."

"A *CANON* is that sort of fugue in which the several parts strictly contain the *same melody* from the beginning to the end; or in which the *guide* and the *answers* are, throughout the whole composition, exactly alike."

"A *FREE FUGUE* is not confined to this obligation; for in that we may introduce various subjects, different from the theme on which the *fugue* began, and break off also at pleasure; however, *every* subject introduced is a *guide*, which must have its answer in the same *solmisation* (intervals) as itself; and these *fresh subjects* must also be very regularly introduced, according to the *different keys* into which the modulation is brought, and which are *proper* to the *chief key* of the composition."

It seems as necessary for the accents of the answers to a canon to fall on the same parts of a bar, as in a fugue; particularly in setting words. Even in Sala's excellent examples of *canon*, when the subject is led off after a minim rest in one part, and a semibreve rest in the *risposta*, or reply, the melody is so disguised, and there is such confusion, that there is no *canon*, nor hardly an imitation, discoverable by the ear from the beginning to the end; so that all the pains and ingenuity that have been bestowed on the construction are thrown away; and if there is any melody in the first part, it is totally destroyed by the second. For eminent writers on *canon*, expressly, see VALENTINI, MICHELE, ROCCO RODIO, and BEVIN.

After all that has been said in this long article, in favour

of *CANON* as an ingenious contrivance, and of its utility among the studies of young musicians; we must own that *canons* which have no other merit than the difficulty of their construction and solution, should never see the light, being the mere offspring of pedantry and dulness; but that such laborious works of this kind as are built on agreeable subjects, and are rich in harmony, may, in *society*, afford great pleasure to real lovers and judges of music, cannot be denied.

CANON of Ptolemy, in *Chronology*, a canon of the Chaldean, Persian, Grecian and Roman kings, compiled by Claudius Ptolemæus, who flourished in Egypt in the reigns of Adrian and Marcus Antoninus, about A. D. 150, from the annals and histories of the several kingdoms to which it relates, and esteemed an invaluable treasure in the science, to which it is subservient. It has been preserved in Commentaries of Theon, and published by Overall and Petavius from two MSS. in the royal library at Paris. In this canon the author computes from the epoch of the Nabonassarean æra, and from that day of the month on which the Egyptian Thoth fell. The years made use of are Egyptian, and consist of 365 days, without intercalation. In every reign the years are reckoned as complete; and those reigns which are less than a year, are omitted, whether they comprehended a Thoth or not. This defect was, in some degree, supplied by additions to other reigns: yet it appears in history, that a year was now and then misreckoned. The first part of this canon has been improperly entitled "Ptolemy's Canon of the Kings of the Assyrians and Medes," as it includes none but kings of Chaldaea or Babylon.

CANON of Ptolemy.

Kings of Chaldea.				Nab. Years.	Yrs of Reign.	B. C.
No.	Names.					
14	Nabonassar	-	-	1	14	747
16	Nadius	-	-	15	2	733
21	Chinzirus and Porus	-	-	17	5	731
26	Jugæus	-	-	22	5	726
38	Mardokempadus	-	-	27	12	721
43	Archians	-	-	39	5	709
45	First inter-reign	-	-	44	2	704
48	Belibus	-	-	46	3	702
54	Apronadius	-	-	49	6	699
55	Regibelus	-	-	55	1	693
59	Melesimordacus	-	-	56	4	692
67	Second inter-reign	-	-	60	8	688
80	Asaradinus	-	-	68	13	680
100	Saosduchinus	-	-	81	20	667
122	Chyniladanus	-	-	101	22	647
143	Nabopolassar	-	-	123	21	625
186	Nabocolassar, or Nebuchadnezzar	-	-	144	43	604
188	Ilvarodamus, or Evil-Merodach	-	-	187	2	561
192	Niricassolazar	-	-	189	4	559
209	Nabonadius	-	-	193	17	555
Persian Kings.						
218	Cyrus	-	-	210	9	538
226	Cambyfes	-	-	219	8	529
262	Darius Hystaspes	-	-	227	36	521
283	Xerxes	-	-	263	21	485
324	Artaxerxes	-	-	284	41	464
343	Darius II.	-	-	325	19	423
389	Artaxerxes II.	-	-	344	46	404
410	Oehus	-	-	390	21	358
412	Arfes	-	-	411	2	337
416	Darius III.	-	-	413	4	335
424	Alexander of Macedon	-	-	417	8	331

Kings who reigned after Alexander.				
No.	Names.	Nab. Years.	Yrs of Reign.	B.C.
431	Philip Aridæus -	425	7	324
443	Alexander Ægus -	432	12	317
463	Ptolemy Lagus -	444	20	305
501	Ptolemy Philadelphus -	464	38	285
526	Ptolemy Euergetes I. -	502	25	247
543	Ptolemy Philopator -	527	17	222
567	Ptolemy Epiphanes -	544	24	205
602	Ptolemy Philometer -	568	35	181
631	Ptolemy Euergetes II. -	603	29	146
667	Ptolemy Soter -	632	36	117
696	Dionysius -	668	29	81
718	Cleopatra -	697	22	52
Roman Emperors.				
761	Augustus -	719	43	30
				A.D.
783	Tiberius -	762	22	14
787	Caius -	784	4	36
801	Claudius -	788	14	40
815	Nero -	802	14	54
825	Vespasian -	816	10	68
828	Titus -	826	3	78
843	Domitian -	829	15	81
844	Nerva -	844	1	96
863	Trajan -	845	19	97
884	Adrian -	864	21	116
907	Antoninus Pius -	885	23	137

Playfair's Chronology, p. 312.

CANON, in *Geometry* and *Algebra*, a general rule for the solution of all cases of a like nature with the present inquiry. Thus every last step of an equation is a canon; and, if turned into words becomes a rule to solve a question of the same nature with that proposed.

CANON, *natural*, of *triangles*, is a table of sines, tangents, and secants together: so called, because serving principally for the solution of triangles.

CANON, *artificial*, of *triangles*, is a table wherein the logarithms of sines and tangents are laid down. See *SINE*, under which article the method of constructing the natural and artificial canon will be explained. See also *GUNTER*, *GUNTER'S LINE*, *SCALE*, and *SECTOR*.

CANON *Law*, a collection of ecclesiastical constitutions, decisions, and maxims, taken partly from Scripture, partly from the decrees of general and provincial councils, and partly from the decretal epistles and bulls of the holy see, and the reports and sayings of the primitive fathers, whereby all matters of policy in the Roman church are regulated.

"If the canon law," says Dr. Robertson (*Hist. Charles V.* vol. i. p. 74, &c. 8vo.) "be considered politically, either as a system pursued on purpose to assist the clergy in usurping powers and jurisdiction, no less repugnant to the nature of their function, than inconsistent with the order of government; or as the chief instrument in establishing the dominion of the popes, which shook the throne, and endangered the liberties of every kingdom in Europe, we must pronounce it one of the most formidable engines ever formed against the happiness of civil society. But if we contemplate it merely as a code of laws respecting the rights and property of individuals, and attend only to the civil effects of its decisions concerning these, we must view it in a different, and a much more favourable light." It is not easy to fix with precision the period at which ecclesiastics first began to claim exemption from civil jurisdiction. In the early and purest ages of the church, they made no pretences to such immunity. The authority of the civil magistrate extended

to all persons, and to all causes. But in ages of ignorance and credulity, the ministers of religion became objects of superstitious veneration. Accordingly we find in Tacitus (*de Mor. Germ.*) that priests were highly revered by the Germans, and that they presided in the assembly of the people. They alone were permitted to chastise, to bind, and to smite; which they did, not by order of the prince, or as his ministers of justice; but as by an inspiration of that Deity, who is always present to those who make war. When the barbarians who over-ran the empire first embraced the Christian faith, they found the clergy in possession of considerable power, and they naturally transferred to these new guides the profound submission and reverence which they had been accustomed to yield to the priests of that religion which they had forsaken. The clergy, whose function was regarded as sacred, availing themselves of the advantage which the superstition and credulity of mankind afforded them, gradually emancipated themselves from subjection to the profane jurisdiction of the laity, and to civil courts; and extended that indulgence which seems at first to have been merely an act of complaisance, flowing from veneration of their character, into a legal exemption. Hence they proceeded to establish courts, in which every question relating to their own character, their function, or their property, was tried. Upon different pretexts, and by a multiplicity of artifices, they communicated this privilege to so many persons, and extended their jurisdiction to such a variety of cases, that most concerns which gave rise to litigation were drawn under the cognizance of the spiritual courts.

Du-Cange, in his *Glossary* (*Voc. Curia Christianitatis*) has collected most of the causes with respect to which the clergy arrogated an exclusive jurisdiction, and refers to the authors, or original papers, which confirm his observations. Gian-noni, in his *Civil History* of Naples, (l. xix. § 3.) has ranged these under their proper heads, and scrutinizes the pretensions of the church with his usual boldness and discernment. M. Fleury observes, (*Hist. Eccles.* tom. xix. Disc. Prelim.) that the clergy multiplied, at such a rate, the pretexts for extending the authority of the spiritual courts, that it was in their power to withdraw every person and every cause from the jurisdiction of the civil magistrate. The ambitious project of erecting a spiritual monarchy, superior to all others, even in worldly power, was manifested by the whole conduct of the bishops of Rome, and of the clergy connected with them, both before and after the period in which the canon law was introduced. This appeared in the canons enacted by their councils for the government of that monarchy; and it was very signally displayed in the canons of the provincial synod, held at Merton in Surrey, A. D. 1258, by Boniface, archbishop of Canterbury. The first canon of that synod forbids archbishops, bishops, and inferior clergy, to appear before civil courts to answer for any part of their conduct which had the most remote relation to church affairs; and threatens the judges, and even the king himself, with the highest censures of the church, if they insist on such appearance. The second relates to patronages; and the third is against the intrusion of clerks into benefices by a lay power. The fourth makes such regulations concerning excommunication, as rendered that sentence truly terrible. The fifth forbids laymen to imprison clergymen. In the sixth, the church claims a right of judging concerning contracts between a clergyman and a layman. The seventh asserts a right of the church to judge and punish Jews. The eighth provides for the perfect security of those criminals who had taken refuge in churches. The ninth, tenth, and eleventh, are designed to prevent all invasions of every kind in the possessions of the church and clergy, which are declared sacred and inviolable. And the two last provide

vide for the church's peaceable enjoyment of all pious legacies and donations. The visible tendency of all such canons was to emancipate the church and clergy from civil authority. We need not wonder then that the laity should be alarmed at such proceedings, whenever they occurred, and by the ambitious spirit which they indicated. In order, therefore, to dispose the laity to submit to usurpations of this kind without opposition or murmur, it was necessary to convince them, that the administration of justice would be rendered more perfect by the establishment of this new jurisdiction. Accordingly, howsoever ill-founded the jurisdiction of the clergy may be, and whatever might be the abuses to which their manner of exercising it gave rise, the principles and forms of their jurisprudence were far more perfect than that which was known in the civil courts. The ecclesiastics, probably, had never submitted, during any period of the middle ages, to the laws contained in the codes of the barbarous nations, but were governed entirely by the Roman law. They regulated all their transactions by such of its maxims as were preserved by tradition, or were contained in the Theodosian code, and other books extant among them. The clergy considered it as such a valuable privilege of their order to be governed by the Roman law, that, when any person entered into holy orders, it was usual for him to renounce the laws to which he had been formerly subject, and to declare that he now submitted to the Roman law. Besides, whatever knowledge of ancient jurisprudence had been preserved, either by tradition or in such books as had escaped the destructive rage of barbarians, was possessed only by the clergy. Upon the maxims of that excellent system, they founded a code of laws consonant to the great principles of equity. Being directed by fixed and known rules, the forms of their courts were ascertained, and their decisions became uniform and consistent. Nor did they want authority sufficient to enforce their sentences. Excommunication, and other ecclesiastical censures, were punishments more formidable than any that civil judges could inflict in support of their decrees. It is not surprising, then, that ecclesiastical jurisprudence should become an object of admiration and respect; and that exemption from civil jurisdiction was courted as a privilege, and conferred as a reward. Nor is it surprising, that even to rude people the maxims of the canon law should appear more equal and just than that ill-digested jurisprudence which directed all proceedings in the civil courts. According to the latter, the differences between contending barons were terminated by the sword; according to the former every matter was subjected to the decision of the laws. The one permitted judicial combats; the other passed judgment with respect to these by the maxims of equity, and the testimony of witnesses. Moreover, the ecclesiastical law established a gradation of courts, through all which a cause might be carried by appeal until it was determined by that authority which was held supreme in the church. The canon law suggested other improvements beneficial to society. Many of the regulations, that are now deemed the barriers of personal security, or the safeguards of private property, are contrary to the spirit, and repugnant to the maxims of the civil jurisprudence, known in Europe during several centuries, and were borrowed from the rules and practice of the ecclesiastical courts. By observing the wisdom and equity of the decisions in these courts men began to perceive the necessity either of deserting the martial tribunals of the barons, or of attempting to reform them. So high in estimation was the jurisprudence of the canon law above that which was exercised in law-courts, that one of the most considerable immunities proposed to those who engaged in the dangerous expeditions for the Holy Land, was the

declaring of those who took the cross to be subject only to the spiritual courts. Du Cange, Gloss. voc. *Crucis Privilegia*. It was not till after the publication of the decretals of Gratian, about the middle of the 12th century, that the canon law attained the rank of a science, and was taught and studied in the schools. It soon after became the most fashionable study among the clergy, and paved their way to the highest honours and richest benefices. About the close of the 12th, or beginning of the 13th century, it was taught with great applause and profit at Oxford, Paris, Orleans, and many other places. We may here observe, that the compilation of the canon law by Gratian, and the subsequent union of the canon law with theology and philosophy contributed, among other causes, to the prevention of the revival of knowledge. Although this compilation was made without judgment, under the authority of Frederick I., it became a body of ecclesiastical jurisprudence, which the clergy were required to study and observe. This code was even made an authoritative guide in moral doctrine and discipline, and prevented the study of ethics, till the middle of the 15th century, when the morals of Aristotle were again permitted to be read. But the worst evil was, that they who had framed the unnatural union of canon law, scholastic philosophy and theology, finding it exceedingly conducive to their own emolument, resolutely opposed all innovations, and proscribed with their whole authority all those learned men, who had the boldness to attempt further improvements in philosophy.

The first "Syntagma" of canon law was composed by John the Scholastic, a priest of Antioch, in the sixth century. He is also the author of the "Nomo-Canonon." Both were published at Paris in Justelle's "Bibliotheca Juris Canonici," tom. ii. In the ninth century, the celebrated Photius compiled his "Syntagma Canonum," and his "Nomo-Canonon." The former has not been published; but the latter was given with a Latin version and Balfemon's commentary, by Justelle, at Paris, 1615.

The canon-law that obtained throughout the West, till the twelfth century, was the collections of canons, "Codex canonum," compiled by Dionysius Exiguus, in 520, and published by Justelle in 1628, and improved by Isidore of Seville, who appropriated them to the discipline of Spain; the capitularies of Charlemagne, and the decrees of the popes, from Siricius to Anastasius.—No regard was had to any thing not comprised in these; and the French have since maintained the rights of the Gallican church to consist in their not being obliged to admit any thing else, but to be at liberty to reject all innovations made in the canonical jurisprudence since that compilation, as well as papal decrees before Siricius.

Indeed, between the eighth and eleventh centuries, the canon-law was mixed and confounded with the papal decrees from St. Clement to Siricius; which till then had been unknown: this gave occasion to a new reform, or body of the canon-law, or harmony of discordant canons; which is the collection still extant, under the title of "Concordia Discordantium Canonum," first made by Ivo, in 1114, and perfected in 1151, by Gratian, a Benedictine monk, from texts of Scripture, councils, and sentiments of the fathers, in the several points of ecclesiastical polity; and containing those constitutions which have been denominated, by way of eminence, the DECREES, and forming the first part of the canon-law. These are the most ancient, as they commence from the time of Constantine, the first Christian emperor of Rome, and they reached as low as the time of pope Alexander III. It is now generally known by the name of the "Decretum" of Gratian, which was formed in imitation of

the Pandects of Justinian; and is a confused immethodical compilation, full of errors and forgeries.

The second part of the canon-law consists of the decrees of the popes, from the time of pope Alexander III. to pope Gregory IX. and published, under the auspices of that pope, by Raymundus Barcinus, about the year 1230, in five books, entitled "*Decretalia Gregorii Noni*."

In 1298, pope Boniface VIII. continued the papal decrees as far as his time, under the title of "*Sextus Decretalium*." To these, pope John XXII. added the "*Clementines*," or the constitutions of his predecessor Clement V. approved by the council of Vienne, and first authenticated about the year 1317. And to all these were afterwards added twenty constitutions of the said pope John, called the "*Extravagantes*;" and some other constitutions of his successors, called "*Extravagantes Communes*." These are usually called the *DECRETALS*.

All these, viz. Gratian's decree, Gregory's decretals, the sixth decretal, the Clementine constitutions, and the extravagants of John and his successors, form the "*Corpus Juris Canonici*," or body of the Roman canon-law; which, including the comments, make three volumes, in folio; the rule and measure of church government. As the *decrees* set out the origin of the canon law, and the rights, dignities, and decrees of ecclesiastical persons, with their manner of election, ordination, &c. so the *decretals* contain the law to be used in the ecclesiastical courts; and the first title in every one of them is the title of the blessed Trinity, and of the catholic faith, which is followed with constitutions and customs, judgments and determinations in such matters and causes as are liable to ecclesiastical cognizance, the lives and conversation of the clergy, of matrimony and divorcees, inquisition of criminal matters, purgation, penance, excommunication, &c. But some of the titles of the canon-law are now out of use, and belong to the common law; and others are introduced, such as trials of wills, bastardy, defamation, &c. Beside these pontifical collections, which during the times of popery were received as authentic in this island, as well as in other parts of Christendom, there is also a kind of national canon-law, composed of *legatine* and *provincial* constitutions, and adapted only to the exigencies of this church and kingdom. See *CONSTITUTIONS*. At the dawn of the reformation, in the reign of Henry VIII. it was enacted, that the canon-law should be reviewed; and till that review took place, such canons, constitutions, ordinances, and synodals provincial as had been made, were not repugnant to the law of the land or the king's prerogative, should still be used and executed. The review was proposed again in the reign of Edward VI. and of queen Elizabeth; but as it was never accomplished, the authority of the canon-law in England depends upon the statute of the 25th Henry VIII. c. 19. which was repealed indeed by queen Mary, and again revived and confirmed by 1 Eliz. c. 1.

As to the constitutions and canons made in the convocation of the province of Canterbury in 1603, ratified by the king, and soon after adopted in the province of York; these never obtained a parliamentary confirmation; and it has been therefore adjudged upon the principles of law and the constitution, that where they are not merely declaratory of the ancient canon-law, but are introductory of new regulations, they do not bind the laity, however the clergy may regard them. *Strange's Rep.* 1057.

Lord Hardwicke cites the opinion of Lord Holt, and declares it is not denied by any one, that it is very plain all the clergy are bound by the canons, confirmed merely by the king; but they must be confirmed by the parliament to bind the laity. 2 *Atk.* 605. There are four species of courts, in

which the canon (and civil) laws are permitted, under different restrictions, to be used. 1. The courts of the archbishops and bishops, and their derivative officers; usually called in our law courts Christian, or the ecclesiastical courts. 2. The military courts, or courts of chivalry. 3. The courts of Admiralty. 4. The courts of the two universities. Their reception in general, and the different degrees of their reception in all these courts, are grounded entirely upon custom; corroborated with regard to universities by act of parliament ratifying those charters, which confirm their customary laws. Dr. Blackstone (*Com. vol. i. p. 84.*) subjoins the following remarks, relating to all these courts. 1. The courts of common law have the superintendency over these courts; to keep them within their jurisdiction, to determine wherein they exceed them, to restrain and prohibit such excesses, and in case of contumacy, to punish the officer who executes, and in some cases the judge who enforces, the sentence so declared to be illegal. 2. The common law has referred to itself the exposition of all such acts of parliament, as concern either the extent of these courts or the matters depending before them. And, therefore, if these courts either refuse to allow these acts of parliament, or will expound them in any other sense than what the common law puts upon them, the king's courts at Westminster will grant prohibitions to restrain and control them. 3. An appeal lies from all these courts to the king, in the last resort; which proves, that the jurisdiction exercised in them is received from the crown of England, and not from any foreign potentate, or intrinsic authority of their own. From these three strong marks and ensigns of superiority, it appears beyond a doubt, that the civil and canon laws, though admitted in some cases by custom in some courts, are only subordinate, and "*leges sub graviore lege*;" and that, thus admitted, restrained, altered, new-modelled, and amended, they are by no means with us a distinct independent species of laws, but are inferior branches of the customary or unwritten laws of England, properly called the king's ecclesiastical, the king's military, the king's maritime, or the king's academical laws. See *COURT*.

CANON Religiosorum, in *Ecclesiastical Antiquity*, a book in which the religious of convents had a fair transcript of the rules of their order, which were frequently read among them as their local statutes; and on this account it was called their "*regula*," or "*canon*." The public books of the religious were the four following: 1. "*Missale*," containing all their offices of devotion. 2. "*Martyrologium*," or a register of their peculiar saints and martyrs, with the place and time of their passion. 3. "*Canon*," or "*regula*," which included the institution and rules of their order. 4. "*Necrologium*," or "*Obituarium*," in which they entered the deaths of their founders and benefactors, that they might observe the proper days for commemorating them. *Kennet's Gloss.*

CANONARCHA, or *CANONARCHUS*, a dignity in the Greek church, answering to the *PRECENTOR* in the Latin, or *CHANTER* in the English church. The word is formed from *κανων* and *αρχη*, *beginning*, or *governing*; because it belongs to this officer to set the canons, or church hymns, and to direct the choir in singing them. A like officer we also find in the ancient monasteries, under the denomination *canonarcha*, whose business was to beat the semantum, or wooden instrument, whereby the monks were called to choir to sing canons. There appear to have been several canonarchæ in the same monastery.

CANONE al fofpiro, in the Italian *Musick*, a canon, the parts of which succeed each other by a *fofpiro*, that is, the time of a crotchet.

CANONESS. in the *Romish Church*, a woman who enjoys a prebend, affixed, by the foundation, to maids; without their being obliged to renounce the world, or to make any vows. There are few of these, except in Flanders and Germany; they are rather looked upon as a seminary and retreat of girls for marriage than an engagement for the service of God.

CANONESSES of St. Augustine, or Regular CANONESSES, are a kind of religious, who follow the rules of St. Augustine, of which there are various congregations. The order of canoneses was first instituted by Lewis the Meek, in the beginning of the ninth century.

CANONGOES, in *Modern History*, a denomination given in Bengal to the registers of land, and hereditary expounders of the usages of the country. They have every where their officers and deputies, and are not liable to removal: and all papers attested by them are received as authentic and decisive in disputes concerning lands and their boundaries.

CANONHERIUS, PETER, ANDREW, in *Biography*, the son of a physician of eminence at Genoa, under whom he received the rudiments of his education, which he completed at Parma, where he applied with equal industry to the study of medicine and jurisprudence. In 1604, probably on his being created doctor in philosophy, medicine, and theology, he published at Parma "Conclusiones philosophicæ et medicæ," 4to. and the same year "De admirandis Vini Virtutibus," 8vo. Antwerp; in 1607, "De Curiosa Doctrina Libri quinque," 4to. Florentiæ. But his principal work is, "In septem Aphorismorum Hippocratis Libros, medicæ, politicæ, morales, ac theologicæ Interpretationes," Ant. 1618, 2 tom. 4to. But the labour of the author has rather obscured, than elucidated the texts he meant to explain. Haller Bib. Med. Eloy. Dict. Hist.

CANONICA, in *Philosophical History*, an appellation given by Epicurus to his doctrine of logic. It was called canonica, as consisting of a few canons, or rules, for directing the understanding in the pursuit and knowledge of truth: and it is represented as a very slight and insufficient logic, by several ancients who put a great value on his ethics and physics. The stress of Epicurus's canonica consists in his doctrine of the criteria of truth. All questions in philosophy are either concerning words or things: concerning things, we seek their truth; concerning words, their signification: things are either natural or moral; and the former are either perceived by sense, or by the understanding. Hence, according to Epicurus, arise three criterions of truth, viz. sense, anticipation or prænotion, and passion. The great canon, or principle, of Epicurus's logic is, that the senses are never deceived; and therefore, that every sensation, or perception of an appearance, is true. Stanley's Hist. Phil. p. xiii. p. 35. See *EPICUREAN Philosophy*.

CANONICA is also used by some ancients to denote the art of music: and it is more particularly used to denote that species of music, which does not determine the intervals of sounds by the ear, but by a canon or stretched chord. See **CANON**.

CANONICAL, something that belongs to, or partakes of the nature of a rule or canon: and amounts to much the same with what we otherwise call regular.

CANONICAL is an appellation more peculiarly given to those writings which have been received as the rule of our faith and practice, and comprehended in the canon or catalogue of the Scriptures. In which sense, canonical stands contradistinguished from apocryphal. Divines generally hold, that those books only of the New Testament are to be accounted canonical, which were either written, or at least

approved and authorized by the apostles. Formerly they were not so well distinguished as among us. In the first ages of the church, Dodwell observes the genuine writings of the apostles used to be bound up together with those now called spurious, and apocryphal; so that it was not manifest, by any public judgment, which of them was to be preferred to the other; but later times thought fit to make a separation.

The Jews allow of no books for canonical, but those written before or soon after the return from the Babylonish captivity, when the gift of prophecy ceased among them. In determining the question, what books are canonical, and what are apocryphal, some have had recourse to the authority of the church. Accordingly, the papists have generally affirmed, in their controversies with the protestants, that the authority of the Scriptures depends upon, or is derived from the power of the church; or, in other words, that it is in the power of the pope, or council, or both, to determine what books shall be received as canonical. Others are of opinion, that there are innate evidences in the Scriptures themselves, which, applied by the illumination or testimony of the Holy Spirit, are the only true proofs of their being canonical, or the word of God. The insufficiency of these two modes of decision has been examined and evinced by several writers, and particularly Mr. Jones, *ubi infra*. The principal, and without doubt, most unexceptionable and satisfactory method by which this question can be determined, is tradition, or the well approved testimonies of those who lived in, or near the time when the books supposed to be canonical, were written. To this purpose Mr. Jones alleges, that the several books of the New Testament, at their first writing, were published abroad to the world, and delivered to the first churches in distant countries, for their use; and they who first received them knew them to be the books of the persons under whose names they were published, and could, and did testify to the succeeding ages, what they thus knew of the facts. This testimony of the primitive churches is still faithfully preserved in the writings of the ancient Christians, and is, therefore, not only a good and sufficient, but the principal means by which we know the truth of the fact, viz. that the books were written by such and such men. Besides, the books contain in themselves evidences of their excellency above all others, which should serve to confirm our faith; and, for our farther help, we may hope to obtain the influences of God's Holy Spirit, to clear our judgments, and free us from prejudices, to help us to perceive the former evidences in their due strength, and so to impress the things revealed on our minds, as to produce a suitable conduct. Moreover, those books which are mentioned in the catalogues made by the most ancient Christian writers of the sacred and inspired books, are to be esteemed canonical, and those which are not found in any of these catalogues, must be considered as apocryphal. And farther, those books are justly esteemed canonical, which the first writers of Christianity have cited in their writings as Scripture, and those apocryphal which they have not so cited. Besides, those books are canonical, which the primitive Christians read in their churches, or public assemblies, as the Scriptures or word of God. Jones's new and full Method, &c. vol. i. See **CANON** and **APOCRYPHAL**.

CANONICAL, post, or deuterocanonical. See **CANON**, and **DEUTERO-CANONICAL**.

CANONICAL is also an appellation given to those epistles in the New Testament, more frequently called catholic, or general epistles.

CANONICAL, canonicus, was also an appellation given to all the officers and ministers of a church or monastery, from the

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the bishop or abbot to the meanest servant, including priests, monks, virgins, and all who were entered in canon, that is, in the matricula or register of the church.

CANONICAL horses, *canonici equi*, was an ancient tax, or tribute, imposed on certain provinces, whereby they were obliged to furnish the emperor with so many horses to mount his cavalry.

CANONICAL hours, are certain stated times of the day, assigned, more especially by the Romish church, to the offices of prayer and devotion. Such are *matins, lauds, sixth, ninth, vespers*. In our country the canonical hours are from eight to twelve in the forenoon, before or after which marriage cannot be legally performed in any parish-church.

CANONICAL institution, a regular and legitimate collation to a benefice, agreeable to the rules of the canon-law.

CANONICAL letters, in the *Ancient Church*, were a sort of testimonials of the orthodox faith, which the bishops and clergy sent each other, to keep up catholic communion, and distinguish orthodox Christians from Arian, and other heretics. When they had occasion to travel into other dioceses, or countries, dimissory and commendatory letters, also letters of peace, &c. were so many species of *canonical letters*. See DIMISSORY.

CANONICAL liberty, a freedom to which certain churches are left, being governed by the ancient canons and usages established before the papal hierarchy was carried to its height: such is that which, of later days, the French call the *Gallican liberty*.

CANONICAL life, the method or rule of living prescribed by the ancient clergy who lived in community. The canonical life was a kind of medium between the monastic and clerical lives.

The orders of monks and clerks were originally distinct; but, in process of time, pious persons instituted colleges of priests and canons, where clerks, actually engaged in the ministry, or admitted for it, might live under a fixed rule, which, though somewhat more easy than that of the monks, was nevertheless more restrained than the secular. This was called the "canonical life;" and those who embraced it, "canons." Authors are not agreed concerning the founder of the canonical life. Some ascribe it to the apostles; others refer it to pope Urban I. about the year 1230, who is said to have ordered bishops to provide such of their clergy as were willing to live in community with necessaries out of the revenues of their churches. Most writers ascribe it to St. Augustine, who, having engaged a number of clerks to devote themselves to religion, instituted a monastery within his episcopal palace, where he lived in community with them. Onuphrius Panvinus says, that pope Gelasius I., about the year 495, placed six regular canons of St. Augustine in the Lateran church.

CANONICAL obedience, is that submission which by the ecclesiastical laws the inferior clergy are to pay to their bishops, and religious, to their superiors.

CANONICAL portion, so much of the effects of a person deceased, as the canons allow to the parish church to which he belonged.

CANONICAL punishments are those which the church may inflict: such are excommunication, degradation, and penance, in Roman catholic countries; also fasting, alms, whipping, &c.

CANONICAL purgations, were ancient methods of proving innocence by ORDEAL, PURGATION, &c. See also COM-PURGATION, OATH, &c.

CANONICAL sins, in the *Ancient Church*, those which were

capital or mortal: such especially were idolatry, adultery, murder, heresy, and schism.

CANONICUM, in a general sense, denotes a tax, or tribute.

CANONICUM is more particularly used in the Greek church for a fee paid by the clergy to bishops, archbishops, and metropolitans, for degrees and promotions.

CANONICUM also denotes a due of first-fruits, paid by the Greek laity to their bishops, or, according to Du-Cange, to their priests. The canonicum is assessed according to the number of houses, or chimnies, in a place.

The emperor Isaac Comnenus made a constitution for regulating the canonicum of bishops, which was confirmed by another made in 1086, by his nephew Alexis Comnenus. A village containing thirty fires, was to pay for its canonicum, one piece of gold, two of silver, one sheep, six bushels of barley, six of wheat-flour, six measures of wine, and thirty hens. Du Cange, *Gloss. Gr. tom. i. p. 578*.

CANONIST, a person skilled in, or who makes profession of, the study and practice of the *canon-law*.

Canonists and civilians are usually combined in the same persons. And hence the title of *doctor juris utriusque*, or *legum doctor*, usually expressed in abbreviation, LL. D. or J. U. D.

CANONIUM, in *Ancient Geography*, a place of the isle of Albion, on the route from Venta Icenorum to Londinium, between Camoladunum and Caesaromagus, according to Antonine's Itinerary. Mr. Camden has placed this station at Chelmsford, and Dr. Gale hath fixed it at Little Canfield.

CANONIZATION, a declaration of the pope, whereby, after a great deal of solemnity, he enters into the list of saints some person who has lived an exemplary life, and wrought miracles; or, as is often the case, performed some singular service for the church, in which a principal part of this kind of merit consists. See BEATIFICATION.

The word *canonization* seems to be of later origin than the thing; there being no instance of the use of the word before the twelfth century, whereas St. Uldaricus was canonized in the tenth. The term is formed from *canon*; because the primitive canonizations were only orders of the popes, or bishops, whereby persons eminent for piety, &c. were inserted in the canon of the mass, that they might be commemorated in the service: because, in those days, the use of martyrologies was unknown in the church. Mabillon distinguishes two kinds of canonization; a *general*, and *particular*; the first made by a general council, or a pope; the second, by a bishop, a particular church, or a provincial council. There are instances likewise of canonizations, or at least of something very like them, by abbots.

At first, only martyrs were canonized; but by degrees they came to confessors, &c.

Canonization anciently consisted in inserting the saint's name in the sacred diptychs, or canon of saints; in appointing a proper office for invoking him, and erecting churches under his invocation, with altars for mass to be celebrated on; taking up the body from the place of its first burial, and the like ceremonies: by degrees, other formalities were added; and processions were made with the saint's image in triumph; the day of his death was declared a feast; and to render the thing still more solemn, Honorius III. in 1225, added several days indulgence to a canonization.

It is a great dispute among the learned, when the right of canonization, which it is owned was anciently common to ordinaries, especially metropolitans and princes, with the pope, became first peculiar to the pope. Some say, Alexander

ander III. made this reserve to the holy see. The Jesuits of Antwerp, in their Propylæum, assert, it was not established till two or three ages ago; and then by a mere custom, which passed tacitly into a law; which appears not to have been generally received in the tenth and eleventh centuries. This, however, is pretty certain, that it was generally allowed before pope Alexander III.; but since his time we read of no saints canonized by any but the popes, to whom he is said to have restricted the privilege and cognizance of canonization: and the archbishop of Vienne in France, and his suffragans, acknowledge it in an authentic manner in the year 1231, by a letter written to Gregory IX. desiring him to canonize Stephen, bishop of Die, who died in 1208. "Quia nemo," say they, "quantalibet meritorum prerogativa polleat, ab ecclesia Dei pro sancto habendus, aut venerandus est, nisi prius per sedem apostolicam ejus sanctitas fuerit approbata."

CANONNICAT, in *Geography*, a small island of North America, in Newport county, Rhode island, extending south nearly as far as the south end of Rhode island, and north about seven miles, its average breadth being about one mile; the south shore forming the west point of Newport harbour, and the west shore being about three miles from the Narraganset shore. On this point is Jamestown. It was purchased of the Indians in 1657, and in 1678 incorporated by the name of Jamestown. The soil is luxuriant, producing grain and grass in abundance. Jamestown contains 507 inhabitants, including 16 slaves.

CANONNIERE is a small loophole or opening made in a wall, for firing through with a musket or fusée. Thus canoniere de retranchemens are openings made in the soldiers' huts or cabins, for firing through on the enemy. The word is not now in general use, that of *craneau* being substituted in its stead. The name of *canoniere*, however, was formerly given to embrasures.

CANONNIERE is also a sort of tent, in which infantry and cavalry lodge on a campaign. One of them, like a hut or cabin, holds seven men. They are of different sorts and sizes, according as they are intended for the accommodation of infantry, cavalry, sutlers, servants, and officers. For a description of their forms or figures, see the article **CASTRAMETATION**.

CANONRY, or **CANONICATE**, the benefice filled by a canon. Canonicate is distinguished from prebend, in that the prebend may subsist without the canonicate, whereas the canonicate is inseparable from the prebend. It is to the canonicate, not to the prebend, that the right of suffrages, and other privileges, are annexed. See **PREBEND**.

CANONSBURY, in *Geography*, a town of North America, in Washington county, Pennsylvania, pleasantly situated on rising ground, near the north side of the west branch of Chartier's creek, 18 miles S.W. from Pittsburg, and 9 miles N.E. from Washington. It contains about 100 houses, and two meeting-houses, one belonging to the Presbyterians and the other to the Seceders. Its academy is flourishing, and a charter was lately granted in the session of the assembly for a college. In its vicinity are several valuable mills.

CANOPICUM, in *Ancient Geography*, a town of Africa Propria, situate between the town of Tabraca and the river Bagradas. Pliny says, that it was inhabited by Roman citizens. It is the "Canopissæ" of Ptolemy.

CANOPUS, in *Astronomy*, a bright star of the first magnitude in the rudder of Argo, a constellation of the southern hemisphere. See **ARGO**.

The longitude of *Canopus*, as given by Halley, for the

year 1700, is $10^{\circ} 52'$ of Cancer, and its southern latitude, $72^{\circ} 49'$. F. Noel, in 1697, found its right ascension $93^{\circ} 54'$, its declination southwards, $52^{\circ} 29'$. F. Feuille, in the beginning of March 1709, observed the declination of *canopus* $52^{\circ} 30' 4''$. F. Thomas, in January 1682, found the declination $52^{\circ} 31' 33''$, its right ascension $93^{\circ} 32' 20''$, longitude, $8^{\circ} 52'$, of Cancer, latitude southern, $75^{\circ} 55'$. Wolf. Lex. Math. p. 303, seq. Mem. Acad. Scienc. ann. 1693, p. 390, seq.

CANOPUS, is also a name given by some of the old astronomers to a star under the second bend of Eridanus. These writers say, that the river in the heavens is not the Eridanus, but the Nile, and that this star commemorates an island made by that river, which was called by the same name.

CANOPUS, in *Ancient Geography*, a town of Egypt, seated at the distance of 120 stadia from Alexandria, near the sea, and at the extremity of the western branch of the Nile, hence called "Ostium Canopicum," or the Canopic branch. This branch commences near Faoué or Fouch, crosses the lake of Behiré or Bahira, and falls into the sea near the scite of Canopus. Near its termination is the lake "Madie" or "Maadiè," denoting in Arabic "passage," which is the remains of this branch. This lake is, at present, only a salt-water lagoon, which has no communication with the Nile, except at the time of its greatest increase. It is passed on horseback, when the overflowing of the river, or a tempestuous sea, has not augmented the depth of the water. In other cases it is crossed in a boat, but the pass is very unsafe and incommodious. The mouth of this ancient branch of the Nile is very narrow, and formed by a bank of sand. On the eastern bank stands a large square building, resembling in its construction that of the French factory at Alexandria, and of all the Caravanseries in Egypt. Beyond Maadiè towards the scite of Canopus; from which the sea forms an immense bight, the sea-shore is so low, that it became necessary to raise ditches or embankments of solid construction and of considerable extent for keeping out the sea, which covered a part of the adjacent ground as long ago as the time of Strabo, and which in bad weather still overflows the dykes, extends as far as the promontory of the présent Aboukir, and inundates a great space of land. Upon these dykes small towers are erected at some distance from each other. The town of Canopus, which is said to have been built by the Lacedæmonians, and which is mentioned by several ancient writers, as Pliny, Tacitus, Seneca, and Juvenal, &c. was erected upon a rock, forming a handsome road for shipping, and elevated above the reach of inundations. Pliny, who collected the testimonies of antiquity relating to this place, says, that it was formerly an island; and the Periplus of Scylax points out a desert island near the Canopic mouth: the local situation of Canopus renders this account credible. The remains of this ancient city occupy a vast extent of ground, which is strewed with ruins that present many objects of admiration to the curious inquirer. The columns of beautiful granite that are found among these majestic ruins, called by the inhabitants of Aboukir, the city of Pharaoh, are of astonishing magnitude, and their capitals are of the finest workmanship; some of these columns were not long ago standing, together with a large arch that formed the entrance to a subterraneous cavern; but they have recently been destroyed by the natives for the sake of the stones, which they employed in their buildings and in repairing the dykes that confine the sea. On the sea-shore are still observable, the foundations of a very large, regular building, in the midst of which is a cavern leading to the sea, where ruins are to be seen at a great distance. Blocks of granite of different forms

forms lie scattered among these remains of antiquity, and in the midst of these occasionally covered by the sea, which has made considerable encroachments, is a colossal statue of a woman, made of granite, fluted through its whole length, and in some of its parts mutilated, which the people of the country conceive to have been the figure of Pharaoh's daughter. By the side of the statue is a very large sphinx, partly mutilated, the pedestal of which is encircled with hieroglyphics almost effaced. The columns of granite with which this place abounds, are probably parts of the magnificent temple, consecrated to the honour and for the peculiar worship of Serapis. Foreigners from the most distant provinces, but particularly from Alexandria, resorted hither in crowds, attracted rather by the pleasures they might enjoy in the city, than for the purpose of offering sacrifices to the god. The priests were, indeed, consulted no less as physicians, than as interpreters of the oracle, and they were occupied in reciting the marvellous cures that were performed here, the honour of which they attributed to Serapis. We need not wonder that this should be a place of great resort, when we consider that the surrounding country, inundated by the Nile, was clothed with the riches of nature, and that the city afforded all the enjoyments of luxury in the greatest profusion. The attractions of the situation, the beauty of the climate, the delicacies of the table, the general affluence of the people, and, in short, the pleasures of every kind, which seemed to have made this their favourite abode; all concurred to make Canopus the most enchanting retreat, and to render its inhabitants the happiest assemblage of people.

"Pelæi gens fortunata Canopi,"

says Virgil, Georg. l. iv. But dissipation had here attained its highest pitch; licentiousness knew no bounds. Strabo (l. xvii. vol. ii. p. 1153.) informs us, that the canal which passed from Alexandria to Canopus was covered night and day with boats, full of men and women, who sung and danced in the most lascivious manner. To the same purpose Seneca observes, (Epist. 51.) that if a sage wished for retirement, he would not choose Canopus as a place of retreat. Juvenal, when he is representing in strong terms, the degree in which the manners of the Romans were corrupted, says, that Canopus itself condemned them:

"— Et mores urbis damnante Canopo."

Upon or near the ruins of ancient Canopus, is built the present *Aboukir*, called by mariners, "Bekier," which has a castle built upon the point of a cape that projects a considerable way into the sea. Some shoals stretching out beyond the cape enclose, in a large bay which is here formed by the coast, a small harbour, where vessels lie in safety, at the foot of the castle, in the front of which is a good roadstead; this was the usual anchorage of French frigates, which cruised in these seas. It was also frequented by merchant-ships, when they were obliged, from bad weather, to quit the new and dangerous port of Alexandria; and likewise by the country "germs" when they could not make Alexandria, or clear the "Boghazs" of the Nile at the mouth of the Rosetta branch. In this roadstead the valiant and now (1806), much lamented lord Nelson obtained his glorious victory over the French fleet. See *ABOUKIR*.

CANOPUS, in *Pagan Mythology*, an Egyptian deity, as some have supposed, whose divinity probably originated in a Greek fable. The Greeks were fond of tracing the arts, sciences, and theological opinions and rites of other nations to a Greek origin. Accordingly they relate, that Menelaus, in his return from Troy, stopped to refit his ships and refresh his crew on the coast of Egypt, near one of the mouths of the Nile; and that,

during his stay, Canopus or Canobus, his chief pilot, was bitten by a viper, and fell a victim to this accident. The city of Canopus, they say, was erected over his tomb, and derived its name from him. This etymology of Canopus is mentioned by Strabo, *ubi supra*. But though Herodotus says that Menelaus had been in Egypt, and has taken notice of the city called Canobus, he does not say a word of Canobus, or of his death. This Greek fable, however, was repeated in the fourth century by Epiphanius, (Oper. t. ii. p. 10. edit. Petavii.) who has made Canopus a particular deity of the Egyptians. Rufinus also has repeated it. (Hist. Eccles. ii. c. 26.) The Chaldeans, it has been said, who worshipped fire, carried their fancied deity through many countries, in order to evince his power to be superior to that of other deities; and as he obtained a complete victory over all the other gods of wood, brass, silver, and gold, his dominion was established, or his claim to worship acknowledged. The priests of Canopus, when they heard of this triumph, determined to give their deity an opportunity of contending with that of the Chaldeans. They represented Canopus under the form of vessels pierced with a great number of holes, which were stopped with wax, in which they were accustomed to purify the water of the Nile; and having filled one of these vessels with water, and painted it with different colours, they fitted to its surface the head of an idol of human shape, and then brought it out to contend with the Chaldean deity. The Chaldeans accordingly kindled a fire all round it; but when the heat had melted the wax, the water gushed out through the holes, and extinguished the fire; and thus, it is said, Canopus conquered the god of the Chaldeans. As a proof that such an Egyptian deity as Canopus actually existed, it has been alleged, that the geographer, Dionysius Periegetes, calls the city of Canopus, the celebrated temple of Canobus of Amyclea:

"Καὶ τέμενος περίπυσον Ἀμυκλαίου Κανόβου."

"There stands Canobus temple known to fame:

"The pilot, who from fair Amyclea came."

This passage, however justly interpreted, affords no evidence that a particular god, called Canobus, had a temple in that city. Homer (Il. B. v. 695.) calls the territory of Pyrrhæus "the temple of Ceres," because its fields were very fertile in corn. Thus also Pindar (Pyth. Od. iv.) calls Lybia and the whole of Egypt, "the fertile temple of the Nile." By a similar metamorphosis, Dionysius might have called the city of Canopus, which he believed to have derived its name from the Mausoleum of Canobus, "the temple of the pilot of Amyclea". The temple of Canopus was that of Serapis; and this deity was worshipped in other countries besides Egypt, under the appellation or distinction of Serapis of Canopus. The singular form under which Serapis was worshipped at Canopus will serve to lead us into an acquaintance with the nature and attributes of this deity, which were different from those of the Serapis or Pluton, brought by the Greeks to Alexandria. This was a bottle, or vessel, as we have above mentioned, made of a very precious clay, which served to filter the water of the Nile, or to render it clear and fit for drinking. The inhabitants of Canopus found this clay in their neighbourhood, and they carried on through Egypt an extensive commerce in these filtering vessels. The medals of Canopus, struck in honour of Adrian, present one of these vessels surmounted with a serpent, which was, without doubt, the good genius, *αγαθος Δαιμων*. This name of good genius had been given to the branch of the Nile which flowed near Canopus. Hence we may conclude, that the great divinity of the Canopians

Canopians was the good genius of the Nile, and that it was represented by a filtrating vessel; but this god of the Nile, which pursued its course in the Canopic branch, was transformed by the Greeks into Serapis. Accordingly they worshipped at Alexandria Serapis-Pluton, and at Canopus, Serapis of the Nile. Many Egyptian vases, called "Canopes," are preserved in the collections of Antiques; some of which may reasonably be supposed to represent the Serapis of the Nile.

CANOPY, in *Architecture* and *Sculpture*, a magnificent kind of decoration, serving to cover, and crown an altar, throne, tribunal, pulpit, chair, or the like. See BALDACHIN.

The word is formed from the barbarous Latin *canopeum*, of *κανοπειον*, a net spread over a bed to keep off the gnats, from *κανωπε*, a gnat.

Canopies are also borne over the head in processions of state, after the manner of umbrellas.

The canopy of an altar is more peculiarly called CIBORIUM.

The Roman grandees had their canopies, or spread veils, called *thense*, over their chairs: the like were also in temples over the statues of the gods. The modern cardinals still retain the use of canopies. The canopy, as we render *κανοπειον* (Judith xiii. 9.) should, as Dr. Shaw suggests (*Travels*, p. 221), rather be called the gnat, or musquetoe net, which is a close curtain of gauze or fine linen, used, all over the East, by people of better fashion to keep out the flies.

CANORASAY, in *Geography*, a small island of Scotland, near the east-coast of the island of Coll.

CANOSA, a town of Italy, in the kingdom of Naples, and country of Bari, destroyed by an earthquake in 1694. It was once episcopal, but the see has been united to the archbishopric of Bari: 31 miles west of Bari. This town occupies part of the site of the ancient Canusium founded by Diomed, and afterwards a Roman colony, which became one of the most considerable cities in this part of Italy for extent, population, and magnificent buildings. The æra of Trajan seems to have been that of its greatest splendour; but it was thus marked as an object alluring to the avarice and fury of the barbarians. Genferic, Totila, and Autharis treated it with extreme cruelty. The province to which it belongs was reduced to a deplorable state in 590. No town in Puglia suffered more than Canosa from the outrages of the Saracens; and the measure of its distress was much augmented by the contests between the Greeks and Normans. In 1090, it was assigned, by agreement, to Bohemund, prince of Antioch, who died here in 1111. Under the reign of Ferdinand III. this estate belonged to the Grimaldis; but on their forfeiture, the Affaititi regained it, and still retain the title of Marquis, though the Capeci are the proprietors of the fief. The ancient city stood in a plain between the hills and the river Ofanto, and covered a large tract of ground. Its ancient grandeur is still attested by many fragments of aqueducts, tombs, amphitheatres, baths, military columns, and two triumphal arches, which seem to have been two city gates. The present town stands above, on the foundation of the old citadel, and is a poor remnant of so great a city, not containing above 300 houses. The church of Sabinus, built, as it is said, in the 6th century, has altars and pavements that are rich in marbles, and the six Verde Antico columns that support its roof are the largest and finest, says Swinburne, which he ever saw of that species of marble. In a small adjoining court, under an octagonal cupola, is the mausoleum of Bohemund, adorned in a minute Gothic style. In 1461,

the prince of Taranto, among other acts of barbarity practised by him at Canosa, broke open this sepulchre, and disturbed the ashes of a hero, who, by his extraordinary military talents, rivalled the fame of his father Guiscard, and by his victories shook the throne of the eastern emperors; and when he was deprived of his Italian inheritance, turned his arms against the Saracens, and formed a new sovereignty for himself in Palestine. As prince of Antioch, he became one of the firmest ramparts of the Crusado against the infidels. Swinburne's *Travels*, vol. ii. p. 321.

CANOSA, in *Ichthyology*, a name given by Salvian, and some other authors to the species of SHARK, called by modern writers *squalus galeus*, the tope of the Cornish fishermen.

CANOSIA, in *Geography*, a town of Piedmont, in the marquisate of Saluzzo; 15 miles S.W. of Saluzzo.

CANOT Cape, lies on the east side of the island of St. Lucia, in the West Indies, towards the north end of the island. On its south side is a bay of the same name.

CANOUGE. See CANOGE.

CANOVIO, a town of European Turkey, in the province of Albania; 22 miles S. of Durazzo.

CANOUL, a town of Hindoostan, and capital of a circar, in the country of Hyderabad; 95 miles S.S.W. of Hyderabad, and 124 E. of Bijnagur. N. lat. 16° 10'. E. long. 78° 7'.

CANOURGUE, LA, a town of France, in the department of the Lozere, and chief place of a canton, in the district of Marvejols. The town contains 2419, and the canton 6430 inhabitants; the territory includes 238 kilometres and 7 communes. It is a place of considerable trade in cattle and woollen stuffs.

CANQUES, in *Commerce*, a sort of cotton cloth made in China; with this cloth they make that first garment next their skin, which is properly their shirt.

CANRENA, in *Conchology*, a species of NERITA, that inhabits the Indian, African, and American seas, and of which there are nearly thirty varieties at present ascertained. It is specifically distinguished by the shell, smooth, with a somewhat pointed spire, and bifid, gibbous, umbilicus, Linn.—*Obs.* There is much reason to believe that some at least of those shells which Gmelin considers as varieties only of his *nerita canrena*, may prove, on further examination, to be distinct species.

CANSADO Cape, in *Geography*, is situated three leagues N.N.E. from Cape Blanco, on the coast of Africa.

CANSCHI, in *Botany*, (Rheed. Mal. i. tab. 42. Burm. Ind. 298.) See *TREVIA Nudiflora*.

CANSCHY, a large tree in Japan, from which the inhabitants make their paper. See a particular account of the process from the Ephem. N. C. in the Coll. Acad. P. Etr. tom. iv. p. 144. It is not certainly known whether it be the paper mulberry, *morus papyrifera*, Linn. *papyrius*, Lam. *broussonetia*, L'Herit. and Ventenat.

CANSJERA. Juss. 448. (Tierou Cansjeram. Rheed. vii. tab. 2. Clafs and order, *pentandria monogynia*. Nat. Ord. *Thymeleæ*, Juss.

Gen. Char. *Calyx* globular-pitcher-shaped, four-toothed. *Corolla* none. *Stam.* filaments four, inserted into the bottom of the calyx; anthers roundish, not extending beyond the calyx. *Pist.* germ superior, very small, enclosed by four scales; style one; stigma capitate. *Peric.* berry one-seeded. A shrub. *Leaves* alternate. *Flowers* with one bracte, in axillary spikes. Character formed from a dried specimen of Sonnerat's communicated by La Marck, except the fruit, which is taken from Rheedé's figure.

CANSO, CANCEU, or CANCO, in *Geography*, an island, cape,

cape, and small fishing-bank on the S.E. coast of Nova Scotia, about 40 leagues E. by N. from Halifax. The island is small, and near the continent, N.E. from Cape Canso, which is the south-easternmost land of Nova Scotia. Canso has a good harbour, about three leagues deep. Here are two bays of safe anchorage. Near these, on the continent, is a river, called Salmon river, on account of the great quantity of salmon taken and cured there. This is thought to be the best fishery of that sort in the world. Limestone and gypsum are found in the gut of Canso, which is a very narrow strait, forming the passage from the Atlantic into the gulf of St. Lawrence, between Cape Breton and Nova Scotia.

CANSO Port, of which the south point is Cape Canso, is situated in N. lat. $45^{\circ} 20' 7''$. W. long. $60^{\circ} 55'$.

CANSO is also a township near the above-named place, in the county of Halifax.

CANSTADT, a town of Germany, in the circle of Swabia, and duchy of Wirtemberg, seated on the east bank of the Neckar. In the town is a manufacture of printed linens, and near it are medicinal springs. It is distant three miles N.E. from Stuttgart. N. lat. $48^{\circ} 51'$. E. long. $7^{\circ} 9'$.

CANSTEIN, a town and citadel of Germany, in the circle of the Lower Rhine, and duchy of Westphalia; 6 miles S.E. of Stadburg.

CANSTRISIUS, an officer in the church of Constantinople, whose business is to take care of the patriarch's pontifical vestments, assist in robing him, and during mass to hold the incense-pot, and sprinkle holy water among the people, while the hymn of the Trinity is singing. The word is also written *Canstrinsius*; it is usually derived from *canistrum*, a name which some suppose given to the incense-pot, others to the kind of basket in which the patriarch's vestments were kept. Du-Cange.

CANSWA, in *Geography*, a river of Hindoostan, which runs into the sea, 40 miles S.S.W. of Junagur or Chunagur, in the country of Guzerat.

CANT, a quaint, affected manner of speaking, or writing, adapted chiefly to the lower sort.

Cant is originally derived from *Andrew Cant*, a Cameronian preacher in Scotland, who, by exercise, had obtained the faculty of talking in the pulpit in such a tone and dialect as was understood by none but his own congregation; and hence the term is extended to denote all sudden exclamations, and whining tones, especially in praying and preaching. This origin of the word, however, has been disputed, and it has been derived from the Latin *cantare*, to sing. Others imagine that it is corrupted from *quaint*, of Fr. *coint*, and Lat. *comptus*.

CANT, or *Canting Language*, is also applied to words and phrases affected by particular persons, or professions, for low ends, and not authorized by the established language. Cant is not restrained to the style of gypsies, thieves, and beggars, but possesses a large department in the politer provinces of the English language. An anonymous author has given a *canting dictionary*, comprehending all the terms used in the several tribes of gypsies, beggars, shoplifters, highwaymen, foot-pads, and other clans of cheats and villains, with a collection of songs in the *canting dialect*. Lond. 1725, 8vo. A writer in the *Tatler*, assigns divers sources of cant-words; as *phizz*, *hippo*, *mobb*, *pozz*, *bamm*, &c. Tat. N^o 230.

The sea-language will most of it come under the denomination of cant; and the like holds of the terms in alchemy, heraldry, not to say in astrology, or even chemistry, pharmacy, &c. In reality the difference between a cant-term, and a technical term it is not easy to assign, unless we choose

to restrain the former to words introduced out of folly, affectation, or imposture; and the latter to such as are introduced for the sake of clearness, precision, and significance.

CANT is also used to denote a sale by auction.

The origin of the word, in this sense, is dubious; it may come, according to some, from *quantum*, how much; according to others, from *cantare*, to sing, or cry aloud; agreeably to which, we sometimes also call it an *out-cry*.

CANT-timbers, in *Ship-Building*, are those timbers which are stationed near the two ends of a ship. They are so called because their planes are inclined to the middle vertical section of the ship lengthwise, or plane of elevation, in contradistinction to those whose planes are perpendicular thereto. And this *canting*, or *inclination* of any timber is such, that it may stand perpendicular, or nearly so, to that part of the ship's side where the timber is stationed.

CANT is also popularly used for an angle, or corner: and cant-pieces are those that are used in the angles of the fishes, and side-trees; or to supply any part that may be sappy or rotten.

CANT, ARENT, in *Biography*, assisted Ruyfch, towards the end of his life, in making his anatomical preparations. He was afterwards a pupil to Albinus, and distinguished for his abilities, but died at a very early age. He left a well-furnished library, abounding particularly in works on anatomy. In 1721, he published "*Impetus primi anatomice ex lustratis cadaveribus nati*," fol. Leid. with six engraved plates representing the muscles of the face, the carotid artery, dura mater, the heart in situ, the stomach, and joint of the knee, in general correctly delineated. Haller Bib. Anat.

CANTA, in *Geography*, a jurisdiction of South America, in the vice-royalty of Peru, and circuit of Lima. It begins at the distance of 5 leagues N.N.E. from Lima, where it terminates in the circado or circuit of that city. Its extent is above 30 leagues, most of which comprehend the first branch of the Cordillera of the Andes, so that the temperature varies in different parts of the country, and is thus beneficial to the fruits of the earth and pastures; and as every species may be appropriated to its suitable degree of heat, the produce is large and very good. The papa is particularly distinguished among the fruits, and the roots find a good market at Lima. The extensive fields of Bombon, which partly belong to this jurisdiction, though cold from their high situation, afford pasture for innumerable flocks of sheep: they are divided into "*Haciendas*," or estates belonging to noble families of Lima.

CANTABILE, an Ital. *adj.* implying *music* fit to be sung; a melody for the voice, not instrumental. A series of measured sounds, of which the *cantilena* is graceful or pathetic, is said to *sing*. To be able to play or sing an *aria di cantabile*, is the highest praise that can be bestowed on a musician. Execution surprises, and for a certain time amuses; but goes no farther than the ear; but to sing a cantabile with tenderness and expression, is conveying sounds to the heart.

CANTABRA, in *Ancient Geography*, a river of India, reckoned by Pliny among the most considerable which discharged themselves into the Indus.

CANTABRI, a people of Hispania Citerior, or Hither Spain, or Provincia Tarraconensis; whose district was bounded on the north by the sea of their name, "*Oceanus Cantabricus*," now called the bay of Biscay; and extended from the country of the Asturii, on the west, to that of the Vasconi, on the east. Pliny divides them into four nations, without distinctly naming them. The Cantabrians inhabited

a mountainous country, and were, in their disposition and habits, ferocious and warlike. The women were no less valiant than the men; and devoted themselves to similar employments. Strabo mentions several facts, evincing the facility with which the females delivered themselves of their children, without requiring any temporary confinement, or any intermission of their usual occupations. He also informs us, that they endured the severest tortures without betraying any concern, and chanted their songs even at the moment of their dying. It was with great difficulty that the Romans subdued this hardy and valiant people. They, as well as the Asturians (see *ASTURIA*), defended themselves for a considerable time with invincible firmness and resolution; availing themselves of the places of secure and inaccessible retreat which their mountains afforded them. They were, however, at length overpowered, and constrained to submit to the arms of Augustus, about 25 years before Christ. Antistius, Furnius, and Agrippa were employed in this service; and after having been driven from their towns, and pursued even to their rugged mountains, whilst the Roman fleet harassed their coasts, they were obliged to shelter in mount Medullius, and were so surrounded, that they had no possible means of making their escape. When this stubborn people found themselves thus encompassed, they preferred a voluntary death to surrender and captivity. Most of them destroyed themselves by the sword, by fire, or by a poison extracted from the yew-tree, or from an herb resembling parsley, which they preserved as a resource against any reverse of fate, because it made them die without pain. Mothers smothered their children, to prevent their falling into the hands of the enemy; and among those who were taken, a young boy was observed, who, having found a sword, killed his brothers, and all his relations, by the order of his father. In like manner, a woman killed all that were prisoners with her. At last, when Augustus had succeeded in subduing them, he determined to soften their ferocity, by compelling them to abandon their mountains; having fold some of the prisoners, he required hostages from those that remained in the country, and fixed their abode in the plains. Impatient of a foreign yoke, they took advantage of the absence of Augustus; they again revolted, and attacked the Roman garrisons with their usual fury. Agrippa was therefore deputed to complete their reduction, but he found the enterprise extremely difficult, so that even the Roman soldiers under his command began to despair of ever accomplishing it. This brave commander, so much were his legionaries disheartened by the resistance and repulses with which they had to encounter, was under a necessity of recurring to intreaties and menaces, and of punishing some of his soldiers with ignominy, before he could induce them to renew their engagement with this formidable enemy. But having at last prevailed upon them to meet the Barbarians in an open field, he so animated them by his example, that, after an obstinate conflict, he obtained a complete victory, and thus terminated this destructive war. Having put to death those who were able to bear arms, and destroyed their castles and strong holds, and forced those who survived to quit their mountains, and to settle in the plain, he subdued them so effectually, that they never attempted to revolt again, but quietly submitted to the Roman yoke. Strabo, lib. iii. Sueton. in August.

The celebrity of the valorous Cantabrians was formerly so great, that most of the provinces of Spain laid claim to the honour of having been comprehended within the limits of ancient Cantabria. Louis XV. created or formed a regiment of this name, the 15th December 1745, which, by an ordinance of the 1st of July 1747, was called Royal *Cantabre*.

Silius Italicus, in his enumeration of the different tribes, people, or nations, whom Hannibal carried with him into Italy, makes the Cantabrians march before all the rest. And Pompey regarded the Cantabrians, and some cohorts of the neighbouring people, as the best troops in his army.

CANTABRIA, the name of a country on the northern coast of Spain, called by the inhabitants *Viscara*, and by others *Biscay*, and comprehending the provinces of *Biscay*, *Alava*, and *Guipuscoa*. See the preceding article. Strabo says, (lib. iii. vol. i. p. 237.) that, according to the report of some writers, the Lacedæmonians had once possessed part of this country, and built in it a city called "*Opticella*." The Goths having invaded Spain, in the 5th century, Leuvigild resolved to subdue that part of it which remained steadily attached to the Romans, and turning his arms against the Cantabrians, took and destroyed the city of Cantabria, situate between Logronno and Viana, and the city of Amaya. But there he terminated his career; afraid to run the risk of penetrating farther among the mountains and desiles inhabited by those people, who, in spite of him, continued faithful to the Romans, though they were entirely expelled from Spain.

CANTABRIAN, the ancient language of the north-eastern part of Spain, in use before the country was subdued by the Romans. Dr. Wallis seems to make the Cantabrian the ancient language of all Spain: which, according to him, like the Gaulish, gave way to a kind of broken Latin called *romance*, or *romanſe*; which by degrees was refined into the Castilian or present Spanish. But we can hardly suppose, that so large a country, inhabited by such a variety of people, spoke all the same language. The ancient Cantabrian, in effect, is still found to subsist in the more barren and mountainous parts of the province of *Biscay*, *Asturias*, and *Navarre*, as far as *Bayonne*, as much as the British does in *Wales*; but the people only talk it: for writing, they use either the Spanish or French, as they happen to live under the one or the other nation. Some attribute this to a jealousy of foreigners learning the mysteries of their language; others to a poverty of words and expressions. The Cantabrian does not appear to have any affinity with any other known language, abating that some Spanish words have been adopted in it for things whose use the *Biscayans* were anciently unacquainted with. Its pronunciation is not disagreeable.

The Lord's prayer, in the Cantabrian tongue, runs thus: *Gure aita cervetan aicena, ſanſtifica bedi. hire icena, ethor bedi hire reſuma, egun bedi hire vorondatea cervan becala lurrean ere, &c.*

CANTABRICA, in *Botany* (Cluſ. Hiſt. 2. 49.). See *CONVOLVULUS cantabrica*.

CANTABRUM, in *Antiquity*. Under the Roman emperors, ſucceeding *Conſtantine*, this was a kind of banner, enſign, or ſtandard, diſſering in this reſpect from the vexillum, that the latter of theſe was a large flag, diſtinguiſhed by its colour, and by a device on it; whereas the former, or cantabrum, was only a ſmall ſtandard and flag, which had alſo a particular colour, and ſerved for rallying and encouraging the ſoldiers. For this purpoſe it is ſaid to have borne on it ſome words or motto of good omen. *Minucius Felix* and *Tertullian* mention it in their apologies, and compare it to a croſs.

CANTACUZENUS, JOHANNES, in *Biography*, emperor of *Conſtantinople* and a learned hiſtorian, was born of an ancient and noble family at *Conſtantinople*, about the year 1295; and having been bred both to literature and to arms, he attained the hiſheſt offices of the ſtate, ſuch as preſect of the bedchamber under *Andronicus the Elder*, and the

the dignity of domestic under Andronicus the Younger. Attaching himself to the interest of Andronicus the Younger, in opposition to that of his grandfather Andronicus the Elder, who abdicated the government A.D. 1328, and having contributed to rescue him from the power of his grandfather, he brought him back in triumph to the palace of Constantinople, after six years of civil war. Under his reign Cantacuzene ruled both the emperor and the empire; and it was by his valour and conduct that the isle of Lesbos and the principality of *Ætolia* were restored to their ancient allegiance. Although he enjoyed many favourable opportunities for enriching himself by oppression and rapine, his enemies confess that, among the public robbers of the empire, Cantacuzene alone was moderate and abstemious. Nevertheless, his wealth, probably devolved upon him by inheritance, appears from his own account of it to have been prodigious; more especially when we consider that it was partly accumulated in the last period of the empire, and in a land, most probably in Thrace, so repeatedly wasted by foreign and domestic hostility. He does not indeed specify the value of his money, plate, and jewels; yet, after several very considerable deductions, his forfeit treasures were sufficient for the equipment of a fleet of 70 galleys. He does not give us either the extent or number of his estates; but his granaries were filled with an incredible store of wheat and barley; and the labour of a thousand yoke of oxen might cultivate, according to the practice of antiquity, about 62,500 acres of arable land. His pastures were stocked with 2500 brood mares, 200 camels, 300 mules, 500 asses, 5000 horned cattle, 50,000 hogs, and 70,000 sheep. Thus distinguished by rural opulence, he enjoyed, in a very high degree, the favour of his sovereign; and though he declined accepting the honour that was offered him of being his associate in the sovereignty, he was named in the last testament of Andronicus the Younger the guardian of his son John Palæologus, who succeeded his father in the ninth year of his age, A.D. 1341, and the regent of the empire during his minority. This trust he discharged with fidelity, till a regard to his own safety rendered it necessary for him to adopt measures of self-defence. A combination, however, was formed against his regency by the dowager empress, Anne of Savoy, the great duke or admiral Apocaucus, and John of Apri, patriarch of Constantinople. By this powerful confederacy Cantacuzene was assailed at first with clandestine, and at length with open, arms. During his absence on the public service he was accused of treason; proscribed as an enemy of the church and state; and delivered, with all his adherents, to the sword of justice, the vengeance of the people, and the power of the devil. His fortunes were confiscated, his aged mother was cast into prison, all his past services were buried in oblivion, and he was driven by injustice to perpetrate the crime of which he was accused. As long as the empress and the patriarch affected the appearances of harmony, he repeatedly solicited the permission of retiring to a private, and even a monastic, life; and after he had been declared a public enemy, it was his fervent wish to throw himself at the feet of the young emperor, and to receive without a murmur the stroke of the executioner. At length he reluctantly adopted the only measure that was likely to avail to his security, which was that of drawing the sword and assuming the imperial title. Accordingly in the strong city of Demotica, his peculiar domain, he assumed the purple, A.D. 1341; maintaining, even in this act of revolt, some shew of loyalty, by causing to be proclaimed the titles of John Palæologus and Anne of Savoy before his own name and that of his wife Irene. Constantinople adhered to the young emperor, and the principal cities of Thrace

and Macedonia renounced their obedience to Cantacuzene. His army, which was stationed in six divisions on the banks of the *Melas*, for the purpose of tempting or intimidating the capital, was dispersed by treachery or fear; and the officers accepted the bribes, and embraced the service, of the Byzantine court. Cantacuzene, driven by Apocaucus from the coast into the mountains of *Servia*, his trusty band of followers was diminished to 2000, and at last to 500, volunteers. The "Cral," or despot of the *Servians*, received him with hospitality; but in a state of miserable dependence, he in vain solicited assistance, and was at length dismissed, without injury, to a new vicissitude of hopes and perils. A civil war commenced, which, after having raged for nearly six years, terminated in a decisive victory on the part of Cantacuzene, who re-entered Constantinople A.D. 1347. The inflexible Anne, destitute of the powers of resistance, or the hope of relief, was at length compelled to yield to the supplications of her friends and enemies; and a treaty was dictated by the conqueror, who professed a loyal and zealous attachment to the son of his benefactor. The marriage of his daughter Helen with John Palæologus, to whom she had been for some time engaged, was at length consummated: the hereditary right of the pupil was acknowledged; but the sole administration, during ten years, was vested in the guardian. Thus two emperors and three empresses were seated on the throne; a general amnesty was proclaimed; and the festival of the coronation and nuptials was celebrated with fallacious appearances both of concord and magnificence. The tranquillity of Cantacuzene and of the empire was, however, soon disturbed by suspicions and enmities between the two emperors and their respective adherents, which at length broke out in a civil war, A.D. 1353. Cantacuzene, aided by the Turks, was successful, and the young emperor was compelled to take shelter among the Latins of the isle of *Tenedos*. The victor, provoked by his insolence and obstinacy, was induced to associate with himself his son Matthew, whom he invested with the purple, and thus he established the succession in the family of the Cantacuzeni. Palæologus, however, assisted by the Genoese, who, by a treaty subscribed by Cantacuzene, A.D. 1352, which forever banished the Venetians and Catalans, obtained a monopoly of trade, and almost a right of dominion, regained Constantinople, A.D. 1355; and Cantacuzene abdicated his share of the government, and retired to a monastery, where, under the assumed name of Joasaph and the habit of a monk, he devoted the residue of his life to literary and theological exercises. His wife Irene also retired to a nunnery, and exchanged her own name for that of *Eugenia*. If, indeed, he issued from this retreat, it was as the minister of peace, to subdue the obstinacy and solicit the pardon of his rebellious son. In the retirement of a cloyster his active spirit prompted him to engage in a controversy against the Jews and the Mahometans, and he composed four apologies for the Christian religion and four discourses or books, (printed in Greek and Latin at Basil, in 1543, by Bibliander and Gualtherus, from Greek MSS.) at the particular request of a proselyte to Christianity, *Achæmenides*, called also *Meletius*, who was assailed with letters from his friends at *Ispahan*. Maracci informs us, that, though he had read the Koran, he adopts the vulgar prejudices and fables against Mahomet and his religion. He also, with equal zeal, defended the divine light of mount *Thabor*; and under the character of emperor and theologian, he presided in the synod of the Greek church, which established, as an article of faith, this uncreated light. See the article *BARLAAM*. In his retirement he also wrote a history of his own times in four books, or at least of those times during which

he was a principal actor, comprehending a period that extends from the revolt of the younger Andronicus, A. D. 1320, to his own abdication of the empire, A. D. 1355, and continued one year beyond the abdication of his son Matthew, A. D. 1357. "In this eloquent work," says Gibbon, "we should vainly seek the sincerity of an hero or a penitent. Retired in a cloyster from the vices and passions of the world, he presents not a confession, but an apology, of the life of an ambitious statesman. Instead of unfolding the true counsels and characters of men, he displays the smooth and specious surface of events, highly varnished with his own praises and those of his friends. Their motives are always pure; their ends always legitimate; they conspire and rebel without any views of interest; and the violence which they inflict or suffer is celebrated as the spontaneous effect of reason and virtue." Vossius, however, without hesitation, prefers him to all the Byzantine historians. A Latin translation of this history, from the Greek MS. in the library of the duke of Bavaria, with notes, was published by Pontanus at Ingolstadt in 1633, fol.; and at Paris in 1645, in a splendid edition consisting of 3 volumes, fol. of the Greek from the MS. of M. Seguier, chancellor of France, with Pontanus's Latin versions, and the notes both of Pontanus and Gretser. Some other treatises by Cantacuzene, who assumed the name of Christodulus the monk, are extant in MS. in the Vatican, Casarean, and Bodleian libraries. The death of Cantacuzene is placed by respectable authority on the 20th of November 1411. (Du-Cange, *Fam. Byzant.* p. 260.) But if he were of the age of his companion Andronicus the Younger, he must have lived 116 years; a rare instance of longevity, which, in so illustrious a person, would have attracted universal notice. *Fabr. Bib. Græc.* t. vi. l. v. c. 5. §. 12. p. 469, &c. Gibbon's History, &c. vol. xi.

CANTADUANES, in *Geography*. See CATANDUANES.

CANTÆ, in *Ancient Geography*, a people of Britain in that part called Caledonia, who, according to Ptolemy, were seated towards the eastern coast on the north side of the frith of Tayne. Mr. Baxter places them in Buchan, which he derives from the British words "Pow Chant," signifying, as he says, the country of the Cantæ.

CANTAL, in *Geography*, a large and lofty mountain of France, which is said to be 993 toises higher than the level of the sea, and always covered with snow. It is situated in the centre of a department to which it gives name, and which is one of the three formed out of Auvergne and le Velay. This department is bounded on the north by the departments of Upper Loire, Puy de Dôme, and Corrèze; on the east by those of Upper Loire and Lozère; on the south by those of Lozère, Aveyron, and Lot; and on the west by those of Lot and Corrèze. Its superficies is about 1,124,802 acres, or 574,081 hectares; its population consists of about 243,708 persons; and it is divided into four communal districts, viz. Mauriac, Murat, St. Flour, and Aurillac.

CANTALIVER, in *Architecture*. This term is used by workmen to denote those blocks which are frequently placed, at regular distances, under the eaves of a house, or the upper mouldings of a cornice, which they serve to support or ornament. Cantaliver, therefore, is essentially the same with modillion; but the latter word is confined to the description of regular architecture, while the former has a general and trivial use.

CANTANUS, in *Ancient Geography*, a town placed by Steph. Byz. in the island of Crete. It was an episcopal see, and mentioned in the acts of the council of Chalcedon.

CANTAR, or CANTARO, in *Commerce*, an eastern weight, of different value in different places, equivalent at Acra in Turkey to 603 pounds, at Tunis and Tripoli to 114 pounds.

CANTAR is also an Egyptian weight, which is denominated a *quintal*, and consists of a hundred, or of an hundred and fifty *rotolos*, according to the goods they are to weigh.

CANTERA, in *Geography*, a river of Sicily, anciently called "Taurominius," which runs into the sea; five miles south from Agosta.

CANTARE, *Ital.* to sing. Singing is a faculty that requires the union of so many gifts of nature, and so much assistance from art, that the complete concurrence and union of both rarely happen. The requisites from nature are a voice full, flexible and extensive in compass, well-toned, sweet, clear, and interesting; with an ear perfectly correct in time and tune. The acquisitions from art are a good *portamento*, or delivery of the voice from the chest, free from nasal or guttural defects, a good shake, good taste and expression, with a rapid, distinct, neat, and articulate execution of divisions, and the power of sustaining a long note with steadiness, and of augmenting and diminishing its force by the most minute degrees.

The individual in possession of all these requisites, will be regarded as a prodigy! and with health, diligence, and good conduct, may be pronounced heir to a great estate, arising from means the most flattering to self-love, and grateful to a good heart: the power of innocently delighting mankind.

These qualifications the critical and fastidious hearer thinks his due—be it so: but in order to balance the account between the performer and his audience, let us remind the latter of the fair and just claims which every performer possessed of great talents has on the public, but in a particular manner, a singer, who having arrived at these captivating powers by unceasing study, toil, and experience, is not only entitled to considerable remuneration, but to regard and attention from the public, for its own sake: for if by neglect, noise, and mortification, a vocal performer's mind is disquieted, and chest agitated, that ardent desire to please those who seem disposed to be pleased, and those efforts which encouragement alone can stimulate, are chilled and paralyzed, to the great loss of the feeling part of an audience, and disgrace of the humbled performer. From such treatment what can be expected but a cold, inanimate, and lifeless performance, without professional zeal, or the enthusiasm of genius and talents.

Garrick used to say, that applause was an aliment without which he could not live on the stage; and inattention to the part he was representing, he never forgave. He complained to an officer on guard, of a sentinel yawning aloud on the stage during his acting one of his best parts; and he never rested till Pinto the first violin, and leader of the band, had quitted his station, after perceiving him fall asleep in the orchestra, in sight of the whole house, while he was acting one of the most impressive and affecting scenes in King Lear.

Singing has long been cultivated and cherished in Italy. In the *Cortegiano* of Castiglione, written at the beginning of the 15th century, we are told of two fingers, whose merit in a totally different style of singing was so equal and so great, that they charmed all hearers. These performers are mentioned to prove, that in all the arts there are various roads that lead to perfection, and different means of delighting mankind. *Bidon*, says the author of that pleasing work, has such force, readiness, and variety of passages, that the souls of all hearers are so excited, inflamed, and ravished, that they seem transported above themselves, and almost

exalted into heaven. Nor does *Marchetto Cara* less excite the affections by a more tender and touching style, which commiserates and soothes the afflictions of others, or with sweet, complaining, heart-felt notes, softens, instructs, and penetrates the mind, for sorrows not their own. Tosi applies to Faustina and Cuzzoni, the two great vocal rivals of his time, these captivating powers by dissimilar talents. And we may, perhaps, with equal accuracy and candour affirm, that such are at present (1802) the excellencies of the *Billington* and the *Banti*, that whoever prefers the one to the other, only proves that the taste of hearers is as various as the style of singing of great performers.

Since the establishment of operas, no professional talents in any of the fine arts have been more celebrated than those of great Italian singers; who being invited to different states and kingdoms, have an opportunity of extending their fame to every part of Europe; and their talents are as well known at Vienna, Madrid, Petersburg, Dresden, Berlin, Munich, and London, as in their own country.

We cannot pretend to render this article a complete elementary treatise on singing, and, indeed, as Johnson truly said of books of instruction, "nothing is well made by a receipt:" yet, to trace, and specify a few of the first principles of the art, may be of some use to vocal students out of the reach of better instructions.

For those who seek vocal precepts in books, we recommend the perusal of *Tosi* and *Mancini*; and as a synopsis of the art, we shall present our readers with *Tenducci's* first injunctions to his scholars. For *solfeggi*, or exercises for the voice, those of *Leo*, on which so many great singers have been formed, are now only useful to the performers of old music; but new melody requires new *solfeggi*, to prepare a singer for divisions and graces of the present times. For such, the most modern, and perhaps the best, are those of *Aprile*, which, however, are now full 30 years old; but many new melodies have been since produced in the vocal compositions of *Pacifiello*, *Cimarosa*, *Sarti*, *Haydn*, and *Mozart*, as well as refinements in the performance of *Pacchieretti* and *Marchesi*, with which young singers should be made acquainted.

The *Cyclopædia*, being intended to assist those who study an art or science without a master, we shall present the solitary student in singing with the following instructions drawn up in Italian, as we imagined by the late Signor *Tenducci*, who brought them to the author of the present article to revise and translate; but on comparing them with the preliminary rules placed at the head of the English edition of *Aprile's Modern Italian Method of singing*, under the title of *Necessary Rules for Students and Dilettanti of Vocal Music*; it appears that the Italian copy of the Instructions, brought by *Tenducci* to be translated, belonged to *Aprile*, and that the English translation of these rules is literally that with which *Tenducci* was furnished by ourselves.

Tenducci's Instructions to his scholars.

Necessary rules for students and dilettanti of vocal music.

I. The first and most necessary rule in singing, is to keep the voice steady.

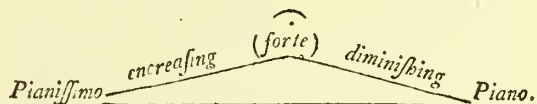
II. To form the voice in as pleasing a tone, as is in the power of the scholar.

III. To be exactly in tune; as without a perfect intonation, it is needless to attempt singing.

IV. To vocalize correctly; that is, give as open and clear a sound to the vowels, as the nature of the language, in which the student sings, will allow.

V. To articulate perfectly each syllable.

VI. To sing the scale, or gammut frequently; allowing to each sound one *breve*, or two *semibreves*, which must be sung in the same breath; and this must be done, in both, a *mezza di voce*: that is, by swelling the voice, beginning *pianissimo*, and increasing gradually to *forte*, in the first part of the time; and so diminishing gradually to the end of each note, which will be expressed in this way,



VII. To exercise the voice in *solfeggio* every day, with the monosyllables, *do, re, mi*, &c.

VIII. To copy a little music every day, in order to accustom the eye to divide the time into all its proportions.

IX. Never to force the voice, in order to extend its compass in the *voce di petto*, upwards; but rather to cultivate the *voce di testa*, in what is called *falsetto*, in order to join it well, and imperceptibly, to the *voce di petto*, for fear of incurring the disagreeable habit of singing in the throat, or through the nose;—unpardonable faults in a singer.

X. In the exercise of singing, never to discover any pain or difficulty, by distortion of the mouth, or grimace of any kind; which will be best avoided by examining the countenance in a looking-glass, during the most difficult passages.

XI. It is recommended to sing a little at a time, and often, and if standing, so much the better for the chest.

XII. That scholars should appear at the harpsichord, and to their friends, with a calm and cheerful countenance.

XIII. To rest or take breath between the passages, and in proper time; that is to say, to take it only when the periods, or members of the melody, are ended; which periods, or portions of the air, generally terminate on the accented parts of a bar. And this rule is the more necessary, as by dwelling too long upon the last note of a musical period, the singer loses the opportunity it affords of taking breath, without breaking the passages or even being perceived by the audience.

XIV. That, without the most urgent necessity, of either a long passage, or of an affecting expression, the words must never be broken, or divided.

XV. That a good *mezza di voce*, or swell of the voice, must always precede the *ad libitum* pause — and *Cadenza*.

XVI. That in pronouncing the words, care must be taken to accord with the sentiment that was intended by the poet.

XVII. That the acute and super-acute sounds must never be so forced as to render them similar to shrills.

XVIII. That in singing, the tones of the voice must be united, except in the case of staccato notes.

XIX. That in pronouncing the words, double consonants in the Italian language, must be particularly enforced, and care taken not to make those that are single seem double.

XX. To practise the *shake* with the greatest care and attention, which must generally commence with the highest of the two notes, and finish with the lowest.

XXI. That the ornaments and embellishments of songs should be derived from the character of the air, and passion of the words.

As *Aprile* was the real author of these precepts, to whom we did not allow an article when we were at work upon the letter

letter A, not knowing whether he was singing Alleluiahs in this world or the next, we shall endeavour here to make him and our musical readers some amends for the omission.

These rules are short, but clear and useful; to such as have neither the advantage of a good master, nor are in possession of Tosi's *Observations on florid Song*, in the original, or the excellent translation by Gaillard, which is now become scarce; and, though the book was written early in the last century, most of the precepts it inculcates are still good, and have not yet been superseded by those of any better work on the subject in our own language. See TENDUCCI.

APRILE, GIUSEPPE, in *Biography*, a celebrated Italian opera singer, with a *soprano* voice, born in 1746. He performed, during 20 years, the principal man's part in most of the great theatres of Europe. In 1763 at Stuttgart; in Jomelli's *Didone*, at Milan; at Florence, serious men's part in burlettas by Anfossi, as *Il Gelofo in cimento*, &c. and at length he fixed at Naples, where we heard him ourselves in 1770.

We found his voice sweet and flexible, but not very powerful, or equal, in its whole scale. He had, however, a good shake, an elegant person, and much taste and expression.

Since that time, his favour, as well as taste and science, increased by study and experience. He had a reflecting and contemplative mind, was well acquainted with the *costume* of past and present times, as well as with the styles of composition and taste in singing. When he retired from the stage, he dived into composition, and composed some of the most graceful and pleasing *duetti di camera*, which perhaps ever appeared. During many years he was regarded as the best singing master in Europe. He composed and published new *solfeggj*, which were very much wanted, as those of Leo, admirable in their day, were become almost vulgar and useless, by the change of style, both in composition and singing.

We were very much pleased with a remark which this enlightened musician made to an English lady, one of his scholars, at Naples, concerning a person of low birth, and without education, being accidentally introduced into high life, and learning to sing, with a powerful voice, a good person, and every requisite necessary for a comic singer, a good mimic, and a great portion of natural humour. But her great ambition was to become, or at least to be thought, a serious singer in the cantabile and *gran guslo* of Italy. But Aprile observed, that "it was impossible she should ever succeed in the serious and pathetic style, not only for want of a disposition for serious things, but a mind accustomed to elegance, refinement, and cultivated feelings."

CANTARILLA, in *Geography*, a town of Spain, in the province of Murcia; 3 leagues from Murcia.

CANTARINI, SIMON, in *Biography*, surnamed the "Pezarese" from his having been born at Pezaro in 1602, was the disciple and friend of Guido, and acquired distinguished excellence as a painter, by imitating that great artist. The works of the scholar were often mistaken for those of the master. He died at Verona in 1648.

CANTARO, in *Commerce*, an Egyptian weight, which at Naples is equivalent to 25 pounds, at Genoa to 150 pounds. At Leghorn there are three kinds of cantaras, one weighing 150 pounds, another 151, and a third 160 pounds. The pound of Leghorn is 8 ounces.

CANTARO is also a Spanish liquid measure, in use especially at Alicant, containing three gallons.

CANTARO is also a measure of capacity, used at Cochín, containing four rubies, the rubi 32 rotolos.

CANTARO, in *Geography*, a town of Naples, in the province of Principato Citra; 8 miles N. N. E. from Policastro.

CANTATA, the title of a short lyric poem, consisting of alternate recitation and air. The word *Cantata*, according to Du Cange, was used in the church as early as the year 1314, to express what we at present mean by *anthem*, with which it is still synonymous in Germany; being chiefly confined in the Lutheran church to sacred music. The Romish church had many admirable *sacred cantatas* during the last century, by Carissimi, Graziani, Bassani, and others. And during the present century, Domenico Scarlatti set one at Rome for Christmas Eve, which was performed in the apostolic palace, 1717. Bononcini set another, 1729, for the same occasion and place. The difference at present between *sacred cantatas* and *motets* seems to be the recitative.

The secular *cantata* is a species of composition extremely well suited to the chamber, in which fewer parts, fewer great effects, and less light and shade, are necessary, than in ecclesiastic or dramatic Music; for the performance being in still life, and the poet and musician without an orchestra or choir to assist in painting the stronger passions, composers aimed, for a long time, at no effects out of the power of a single voice and a single instrument to produce.

Cantatas of considerable length, accompanied by a numerous band, are usually performed in Italy on great occasions of festivity: as the reconciliation of princes after long disunion, or the arrival of great personages in the capital of a state. Thus, when pope Ganganelli and the king of Portugal were reconciled, in 1770; and soon after, when the Emperor Joseph arrived at Venice, on his first visiting Italy, cantatas were sung at Rome and Venice equal in length to an opera. But these differ essentially from what is usually meant by a cantata or monologue for a single voice, consisting of short recitatives, and two or three airs at most; as they are occasional poems in which several singers are employed; but though in dialogue, they are performed, like oratories, without change of scene, or action.

As *cantatas* were first suggested by the musical recitation of the opera in which the chief events were related in recitative; in like manner they received several progressive changes during the 17th century, previous to their perfection. First, they consisted, like opera scenes, of little more than recitative; with frequent formal closes, at which the singer, either accompanied by himself or another performer on a single instrument, was left at liberty to shew his taste and talents.

The next change was in having a single air, generally in triple time, distinct from the recitative, and repeated to different stanzas after each narrative part of the poem, like modern ballad airs. At this time the term *da capo* not being in use, the air was written over again, as often as it was wanted, sometimes in exactly the same notes, but more frequently, with little changes and embellishments to the same base, and to different stanzas.

Before the invention of recitative, madrigals for voices alone, and afterwards for instruments in unison with the several vocal parts, constituted the chief music that was performed in the chamber, and in private concerts, till solo songs, accompanied by a single instrument, were brought into favour by Caccini and his imitators, in Italy and other parts of Europe. See CACCINI.

Adami tells us, page 194, that Giovanni Domenico Poliaschi Romano, admitted into the Pope's chapel 1612, composed several cantatas in a good style, and in the best taste of singing, which were printed 1618; and page 195, that the Cavalier Loreti Vittorij da Spoleto, soprano in the pope's chapel 1622, and one of the first *evirati* employed in musical dramas on the stage, was a celebrated composer of *Arie*, e *CANTATE da Camera*.

The first time, however, that we have found the term *CANTATA*, used for a short narrative lyric poem, was in the *Musiche varie a voce sola* del Signor Benedetto Ferrari da Reggio, printed at Venice 1638; which is twenty years more early than the period at which the invention of cantatas is fixed by some writers, who have given the honour to BARBARA STROZZI, a Venetian lady, who, in 1653, published vocal compositions, under the title of *CANTATE, Ariette e Duetti*. Ferrari, detto della tiorbo, for his excellent performance on that instrument, was one of the earliest composers of operas for Venice. Of the two first musical dramas that were performed in that city, 1637 and 1638, Ferrari was only the poet; but in 1639, he was author both of the words and music of the opera of Armida, as he was of several subsequent musical dramas.

Carissimi, Cesti, Luigi Rossi, Stradella Legrenzi, Bassani, Alessandro Scarlatti, Gasparini, d'Astorga, Marcello, Bononcini, Porpora, and Handel, all cultivated cantatas, and added something to the beauty of their construction.

The golden age of *Cantatas*, in Italy, was the beginning of the last century, when they were brought to their greatest degree of perfection, without other accompaniment than a base viol, and harpsichord, by the genius and abilities of Alex. Scarlatti, Francesco Gasparini, Giovanni Bononcini, Antonio Lotti, the Baron d'Astorga, and Benedetto Marcello; and, at a later period in a more elaborate style, with accompaniments, by Nicolo Porpora, and Giovanbattista Pergolesi, who seem to have been the last eminent composers that cultivated this species of chamber drama, till it was revived by Sarti.

The most voluminous and most original composer of cantatas that has ever existed, in any country to which our enquiries have reached, seems to have been Alessandro Scarlatti. Indeed, this master's genius was truly creative; and we find part of his property among the stolen goods of all the best composers of the first forty or fifty years of the last century.

Pergolesi's cantatas will be considered with his other works, elsewhere.

The French followed the Italian fashion in their rage for *cantatas*. Their great lyric poet, Baptiste Rousseau, and others, wrote a great number, which were set *à la Lulli*, and sung *à la Française*; but having never been heard out of France, nor could the music now be found, we believe, in it, we shall be excused, it is hoped, if we refrain from disturbing the ashes of the dead. There is an excellent critique on *Cantatas*, particularly those of his own countrymen, by M. Ginguené, in the new *Encyclopédie*, in which he has treated the subject with much judgment and good taste.

In England, *cantatas* were published early in the last century, by Handel, Bononcini, Attilio Ariosti, Gasparini, Roscigrave, and Dr. Pepusch; as difficult to find now, perhaps, as those of Clerambaut, Monteclair, Campra, Moutet, and Batistin, in France.

But *Cantatas*, which were composed with more care, and sung with more taste and science than any other species of vocal music, during the latter end of the 17th century and beginning of the last, seem to have been wholly laid aside, after the decease of Pergolesi, till revived by Sarti, who has set, in the manner of cantatas, several of Metastasio's charming little poems, which he calls *canzonette*. These exquisite compositions were produced by Sarti expressly for the voices of Pacchierotti, Marchesi, and Rubini, and are, in all respects, the most perfect and complete models of *chamber music* that have ever come to our knowledge.

Indeed, it is to be lamented that a species of composition so admirably calculated for concerts as the *cantata*, should now be so seldom cultivated: as it contains a little drama entire, having a beginning, a middle, and an end, in which the charms of poetry are united with those of music, and the mind is amused while the ear is gratified. Opera scenes, or single songs, now supply the place of cantatas in all private concerts; but, besides the loss which these sustain when taken out of their niche, as they were originally calculated for a numerous orchestra, they can seldom be completely accompanied by a small band.

CANTATILLES, French, the diminutive of *Cantate*. It seems to be equivalent to *Canzonetta* in Italian, when a few lines of recitative precede a short air.

CANTATRICES, in *Middle Age Writers*, hired weepers, and waiters at funerals.

CANTAYA, in *Geography*, a small island of the East Indian Ocean, situate in a gulf formed by the west point of the island of Java.

CANTECROIX, a town of Brabant, in a small territory of the same name; 5 miles S.E. from Antwerp.

CANTEEN, in French *Cantine*, is the cabaret, tavern, or place in a garrison-town or city, where the garrison or troops have the privilege of purchasing spirits, wine, and beer at a much cheaper rate than they can buy them at other taverns or public houses. For the most part every citadel, fort, fortress, and castle, has the *droit de cantine*.

CANTEEN for tobacco, in French *Cantine du Tabac*. By an ordinance of the 30th July, 1720, the king of France established a sufficient number of such canteens for furnishing his troops with the tobacco necessary for their consumption.

CANTEEN-master, or *Canteen-keeper*, in French *Cantinier*, is the person who has charge of the canteen, disposes of things in it, and makes the proper, necessary, and authorized distributions in it.

CANTEEN, a small vessel usually made of tinned plate or wood, in which soldiers, when on their march, or in the field, carry their liquor. The use of wooden canteens has for some time been general in the British armies. They are made cylindrical, like barrels, $7\frac{1}{2}$ inches diameter, and 4 inches long outside, holding three pints. (See *Manufacture of CANTEENS*, Plate I. fig. 1.) Mr. George Smart, a very ingenious mechanic of Ordnance Wharf, Westminster-bridge, who manufactures these in great numbers for government, having adopted and contrived a very complete set of machines for abridging of labour therein, has liberally permitted us to describe and make drawings of this manufacture, which will, we trust, be acceptable to our readers. The wood which Mr. Smart uses, is the best wainscot, or foreign oak, which is sawed out into boards $\frac{3}{4}$ of an inch thick; these, after being planed, are cut in the direction of the grain, into slips $1\frac{1}{4}$ inches broad, and the whole length of the board, by a circular saw called a ripping-saw, similar to that in fig. 2. except that the groove, G, and slider, H I, are omitted; A is the circular, or wheel-saw, made of steel plate, with fine teeth; on the end of its axis is a pulley, B, turned by a band going round it, and round a large drum under the bench, CC, driven by a horse-wheel. In fig. 3. is shewn the manner of fixing the saw, A, to its spindle, between two pieces of metal, C and D; one of which, C, is part of the spindle, and the other, D, is a moveable one, pushed towards the saw by a nut, E, working on a screw, at the end of the spindle; the plane of the saw in the ripping machine is not fixed exactly at right angles to the bench, CC, but at the proper angle for the staves of the canteen, (which are cut from these slips,) when put together to form a cylinder of the true size. The truth with which these saws cut, being so great, that the edges

edges do not want planing. D, *fig. 2.* is the guide for the edge of the board as it is cut, which, for cutting slips of different widths, can be moved nearer to, or farther from the saw, by loosening the thumb-nut, E, the screw from which move: in an opening, F, in the bench, CC, and it is always kept parallel to the plane of the saw, by two equal levers, L, L. A workman takes one of the boards, and puts its edge against the guide, D; when he pushes it forwards, the saw, A, cuts it along into slips very quick; these slips are delivered to another workman, who uses a saw, called a cross-cutting saw, represented in *fig. 2.* the guide and saw of which have been before described; G, is a groove cut in the bench to receive a slider, H, across one end of which another piece, I, is fixed, having a notch, J, in the under side for the saw to pass through, when it is slid forwards; the end of the slip, K, which is to be cross-cut, is pushed up close to the guide, D, and the piece, I, and slide, H, are pushed towards the saw which cuts it off instantly; the slide is then drawn back, and the slip, K, pushed up to the guide, D, for another length as before. These pieces, which are $4\frac{1}{2}$ inches long, and $1\frac{1}{2}$ inch broad, are for the staves of the canteen. The staves, *b*, *fig. 1.* and *fig. 6.* which have a hole in them for the cork or bung, are first cut out by the same means as the common staves, but of twice the thickness; the piece, *a b c*, *fig. 6.* of this is cut out at once, by a machine called a tenoning or rebating machine, shewn in *fig. 4.* A A is a bench, in the middle of which is fixed a frame, carrying two circular saws, set at the proper angle to each other, to cut out the piece; D, is an inclined bed, with a groove, G, and slider, H and I, (as before described in *fig. 2.*) at the bottom of this bed, is fixed a piece of thick iron plate, E, acting as a guide to the staff while it is cutting; near the middle of this bed is the saw, *c*, the plane of which is parallel to the bed, D: a little farther on the bed is the saw, *d*, with its axis nearly horizontal; that end of its spindle which carries the saw, is supported by a crooked iron, *e*, fastened down to the frame by screws, so as to be capable of adjustment; the pulleys, *f* and *g*, on the spindles of the saws, are very near to each other, so that the same band turns them both; it first passes round a large drum, driven by a horse-wheel, under the floor, then comes over a pulley, *b*, to change its direction; it next passes round the pulley, *g*, and then *f*, turning the two saws, (as represented separately in *fig. 5.*) it afterwards passes over the two pulleys, *k* and *l*, to change its direction to the drum again: the piece of wood which receives the pulley, *l*, can be slid in and out of the tube, *m*, and fixed at any place by a pin, to tighten the band as it stretches: the piece of wood intended for the staff is laid against the cross, I, of the slider, H, and held tight while it is pushed forwards; the saw, *c*, cuts the plane, *a b*, *fig. 6.* and as the staff advances, the plane, *b c*, is cut by the saw, *d*, *fig. 4.* The hole, *d*, in these staves, for the corks, are bored by the machine represented in *fig. 7.* A, is a spindle with a pulley, B, on it, turned by a band, going quite round it, and a drum (with a velocity of 1800 revolutions per minute); at the end, *a*, of this is a male screw to fasten on the common borer, or centre-bit, *fig. 8.*; D and E, *fig. 7.* are two smooth wooden rails, for a slider *fig. 9.* to move upon, in the middle of which is fastened a small piece of wood, *a*, having a hole through it at *b*, and a shoulder at *d*; the workman takes one of the staves out of the box, G, and, putting one of its ends against the shoulder, *d*, of the slider, *fig. 9.* and one of its edges against the bottom board, holds it fast, while he pushes it forward against the borer. When it is necessary to use a different sized borer, the slides, D and E, and frame, H H H, which holds them, can be raised or lowered, and fixed by two screws, I, J. The common

and bung staves thus prepared, are given to a workman who uses tools represented by *figs. 10, 11, and 12, CANTEEN.* Plate II. *fig. 10.* is a thick block of wood, in which is turned a circular groove, *a a*, $\frac{1}{2}$ an inch deep, and $\frac{1}{2}$ of an inch wide; it is for setting the staves up in; when the groove is filled with staves, the workman takes a screw-hoop, *fig. 11,* which is a thin plate of steel, with a square lump at one end, and another near the other end, to receive a screw, *c*, to tighten it; the workman puts this tool over the staves, as seen in *fig. 13,* and turns the screw, *c*, until the staves are brought close enough, to drive on the iron truss-hoop, *fig. 12.* These cylinders, or canteens, are taken to a workman, who turns them in a lathe, *fig. 14,* where A is the pulley on the mandrill, turned by a band from a large wheel, worked by a man; B is a conical chuck, on the end of the mandrill, on which a canteen is driven by a mallet; the lathe is then set to work, and the ends of the staves or chime turned smooth by a tool laid in the notch, *a*, of the rest, C; another tool like a hook is then used, for cutting the groove on the inside of the staves, for receiving the head. The boards for the heads are first sawn out, as before described, into squares $7\frac{3}{4}$ inches each side, these are cut circular by a lathe, *fig. 15:* the mandrill has a wooden chuck on one end, with four steel points in it; a workman takes one of the square boards, G, and puts it up against the points in the chuck, and to confine it while it is turning, he uses a piece of wood, D, one end, *d*, of which is placed against the middle of the board, and the other has a small hole in it to receive the point of a screw, F, working in the puppet, E: the lathe is then turned, and the board cut to the proper diameter, by a chisel laid in the notch in the rest, C. The next operation is heading and hooping the canteens, which is done by knocking off one of the truss-hoops, and putting one of the heads into the groove; the staves are then tightened by the screw hoop, *fig. 11,* so that the hoop of the canteen may be driven on; the other head is then put in, and the hoop on, in the same manner; and the wires, *a*, and another not seen, *fig. 1,* are put in; they are for receiving the belt by which the canteen is carried by the soldier. They are, lastly, proved, by pouring a small quantity of hot water into them, and stopping the cork-hole with a wooden stopper, when they are shook, and the hot water rarefying the air within, the same will rush out violently, and discover any small leak that it may have. The slips of iron plate for the hoops are cut from large plates of sheet-iron, by the shears, *fig. 16.* A is the centre of a strong wooden lever eight feet long, which has a steel blade, *a a*, two feet long, fixed by three screws to the under side of it; D is a strong bed shewn separately in *fig. 17,* on the top of which the other blade, *b b*, is fixed, by three hooks, *c, c, c*, the upright legs of which go through the bed, and are fixed by three nuts; between the back of the blade and these hooks, three wedges, *d, d, d*, are put in; by drawing which the blade can always be brought near enough to the other blade, *a a*, to cut; CC. are two guides to steady the lever, B; near one end of the blade a piece of iron, *e*, is fixed on the lever, B, which acts as a stop to the edge of the plate, E, as it is cut; *f* is another stop for the same purpose, which slides through a hole in the bed, and is pushed up by a spring, *g*, under the bed. The plate of iron, E, is pushed forwards from behind by one man, while another is lifting up the lever, B, till it reaches the stops, *e, f*; the man at the handle then pushes it down, and cuts the length of a hoop at once off the plate, when the lever is down the under side of it pushes down the stop, *f*, so that the hoop may fall off; when the lever is lifted up to cut another hoop as before. The holes for the rivets of the hoops are next punched by a machine, represented in *fig. 18.* A is an iron lever, having a punch fixed

fixed in it at B, under this is fixed a dove-tailed groove, C, to hold a piece of steel, *d*, which has several holes of different sizes in it, to suit different punches, any one of which can be brought under the punch, and fixed by the screws, in each side of the groove, C: across the top of the groove, an iron plate, *e*, is fixed, with a hole in it, for the punch to go through; its use is to prevent the hoop, (which is put under it), after it is punched, from rising with the punch; D is a screw put into the bench, to prevent the punch from being driven too far into the hole; the boy who works this machine lifts up the lever, A, puts one end of the hoop under the plate, *e*, and then pushes it down, which makes the hole; he then lifts it up again, and puts the other end under to make the hole in it; first hooking the hole before made, over the pin, E, which determines its length.

After the hole is punched, a machine, shewn in *fig. 19*, is used, to cut the ends of the hoops round; A is the lever, and B the cutter fastened to it; C is the other fixed cutter, which can be adjusted by a screw, E, fixed to the bench; F is a guide, between which the lever, A, passes, to keep it steady; the end of the piece of iron for the hoop, is laid by the boy who attends the machine, upon the fixed cutter, C, and the handle is pushed down to cut it off. The hoops are then bent round a block, and riveted in the common way. By these ingenious contrivances, the operations are rendered so simple, that a good workman will head and hoop 200 of the canteens in one day, working 14 hours; and two active men will cut with the shears, (*fig. 16*,) 60 hoops in a minute: great attention must be paid to keeping the truss-hoops always of the proper size, as they are apt to expand with continual use, which is the reason of their being so thick, (*fig. 12*,) and if they are too large, the heads of the canteens will not fit.

CANTEL, *Cantellum*, in *Ancient English Writers*, denotes a custom of selling by the lump, without tale or measure. Spelman derives the word from *quantillum*, and defines it by over measure, or what is added over and above strict measure. Kennet derives it from the old word *cant*, a hundred, that is the sale of about a hundred weight; answering to what we now call the taking of a hundred pound on content; as when we take it in a bag, sealed up without telling the pieces.

CANTEL, PETER-JOSEPH, in *Biography*, was born in the diocese of Rouen, in 1645; and having entered into the society of the Jesuits, passed his days in their college at Paris, where he devoted himself to literature, with an ardour which hastened the termination of his life, in 1684. His principal labours consisted in preparing the Delphin editions of the classics: and he published Justin and Valerius Maximus, the latter of which he enriched by six dissertations on Roman affairs. He also wrote a treatise "De Romana Republica," printed at Paris, in 1684, 12mo. and esteemed an excellent abridgment of Roman antiquities; also, "Metropolitanarum Urbium Historia Civilis et Ecclesiastica," tom. i. Paris, 1684, 4to. *Nouv. Dict. Hist.*

CANTELEU, in *Geography*, a town of France, in the department of the Lower Seine, and district of Rouen; one league W. from Rouen.

CANTEMIR, DEMETRIUS, in *Biography*, prince of Moldavia, and a descendant of a noble Tartarian family, was born in 1673, and educated in part at Constantinople, whither he was sent in his youth as a kind of hostage. Disappointed by the Ottoman Porte in his expectations of succeeding his father, as prince of Moldavia, he conceived a prejudice against the Porte; and though he continued at Constantinople till the year 1710, when the war broke out between the czar Peter the Great of Russia and the Porte, and was

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appointed by the latter, governor of Moldavia, he preferred the rank of prince of the country. With this view he violated his fidelity, and entered into an agreement of mutual aid and friendship with the czar. When the Russian arms failed of success, he was obliged to quit the Turkish territories, and to follow his new patron, who recompensed him with the title of prince of the Russian empire, sovereignty over the Moldavians settled in Russia, and other considerable appointments. His residence was at Charcof in the Ukraine till 1713, when he removed to Moscow. Here on occasion of his second marriage with a Russian princess in 1719, he shaved his beard, and changed his Turkish mien for the European. The czar made him a privy-counsellor; and Cantemir accompanied him in his different wars, conducting himself so as to gain general esteem. In going to Derbent he was shipwrecked, and lost several papers which he had taken great care and pains in composing. He died at his estate in the Ukraine in 1723. Cantemir was studious and learned, and is said to have understood 11 languages. He was the author of several works. His "History of the Growth and Decay of the Ottoman Empire," A. D. 1300—1683, written in Latin, and published in an English translation by Tiadal, Lond. 1734, fol. is charged by Gibbon (*Hist. vol. xi. p. 434.*) with containing strange blunders in oriental history, though he acknowledges that the author was conversant with the language, annals, and institutions of the Turks. His "System of the Mahometan Religion," was written and printed in the Russian language, by order of czar Peter; his moral dialogues entitled "The World and the Soul," were printed in Moldavia in Greek and Moldavian; "The present State of Moldavia," was printed in Latin; his "Musical Airs with Turkish Words," and "An Introduction to Music," in Moldavian. He was also the author of other pieces, which were either lost in his shipwreck, or still remain in MS. *Moreri. Gen. Biog.*

CANTEMIR, ANTIOCHUS, was the son of the preceding, by whom he was carefully educated, and initiated in state-affairs. He was successively ambassador from the Russian court to those of London and Paris; and, in the different revolutions of his own country, he conducted himself with singular prudence. His chief distinction consisted in his having first applied the Russian language to the composition of poems of any extent or dignity; and he wrote translations of Anacreon and the epistles of Horace, besides various satires, odes, fables, &c. His satires, like those of Boileau, were a happy mixture of strong sense and poetry, and many of his verses are become proverbial in the Russian language. He also published translations in prose of the "Plurality of Worlds," the "Persian Letters," and "Algarotti's Newtonian Dialogues." He was a member of the academy of Petersburg, and died in 1744. The abbé Guaresio wrote his life in French, and translated his satires into that language. He was much inclined, at an early age, to the study of the Scriptures, and printed a "Concordance to the Psalms," in the Russian language. *Nouv. Dict. Hist.*

CANTER, WILLIAM, an eminent linguist and philologist, was born at Utrecht of an eminent and respectable family in 1542, and studied first at Louvain, and then at Paris. Being obliged to leave Paris in 1562, on account of the civil wars, he visited several universities in Germany and Italy, and at length settled at Louvain, where he pursued his literary occupations with an assiduity and ardour, which terminated his life at an early age in 1575. Thuanus says, that he deserved to be reckoned among the most learned men of his age, and laments his immature death as a great loss to literature. He understood six languages, besides that of his own country, viz. the Latin, Greek, Hebrew, French,

French, Italian, and German. Temperate, and even abstemious in his diet, he was singularly methodical in the distribution of his time for study. He began at seven in the morning, and not sooner, because early rising did not suit his constitution, and pursued his literary avocations very intensely till half past eleven. He then walked out an hour before dinner, and another hour after he had dined. Having slept an hour upon his couch, he resumed his studies, and prosecuted them without interruption till midnight, devoting the last hours of the day to correspondence with his friends, and other business that required a less degree of attention and labour. He had collected, during his short life, a very excellent and curious library, consisting of the best authors in various languages, and a number of Greek MSS., which it was his intention to have published with Latin versions and notes, if his life had been prolonged. The damage which his library sustained from an inundation at Louvain in the winter of 1573, was an affliction, which would have proved fatal to him; if his friends had not assisted him in collecting his scattered books and MSS., and repairing the injury they had sustained. The principal works of Canter are eight books under the title of "Varia Lectiones," containing emendations and explanations of several ancient authors, published at different times, and reprinted in Gruter's Thesaurus, tom. iii. Latin versions of the "Cassandra of Lycophron," of some "Pythagorean ethical Fragments from Stobæus," of the "Discourses of Aristides," and of "Synesius," &c. Notes on the "Familiar Epistles and Offices of Cicero," various readings on several MSS. of the "Septuagint," editions of "Euripides," of "Æschylus," of "Sophocles," and of various other authors; and several Latin poems in the *Deliciæ Poetarum Belgarum*. Moreri.

CANTER, in the *Manege*, denotes the slow gallop, which is a soft and easy pace in which most people delight. Berenger (*Hist. and Art of horsemanship*, vol. i. p. 71.) conjectures, that our word canter, expressive of this pace, may owe its derivation to the Latin term "Cantherius," which was the appellation of the horse, that usually performed it. Dr. Johnson, in his Dictionary, calls this pace the Canterbury gallop, and defines it to be the hand gallop of an ambling horse, called a canter, and probably derived from the masters riding to Canterbury on easy ambling horses. "How just the derivation may be," says Berenger, "I will not presume to decide; but the definition must puzzle all who are horsemen, and all who are not." See CANTHERII.

CANTERBURY, in *Geography*, is the capital of the county of Kent, and the metropolitical see of the archbishop, who is primate of all England. The present city occupies a site which, during the Roman colonization of Great Britain, was a military station of that warlike people, and, according to the opinion of many eminent antiquaries, was the Durovernum of Antoninus's Itinerary. Three other principal Roman stations, which Mr. Somner calls *Castra Riparenfis*, were connected with this, by three different Roman roads, some traces of which have been discovered. The names of these stations, and their respective distances, are thus given by Antoninus. From Durovernum to ad portum Ritupis (Richborough) 12 miles; to ad portum Dubris (Dover) 14 miles; and to ad portum Lemanis (Lime) 16 miles. Without entering into the Roman history of this place, it may suffice to remark, that various relics of that people have occasionally been found here. Besides some seats and walls, which appear to have a Roman foundation; some Mosaic pavements, urns, coins, &c. that have been discovered, are evident memorials of that people. In the Saxon heptarchy, Canterbury, or, as then called, Cantwarabyrig, was the principal place in the kingdom of

Kent, and, during the reign of Ethelbert, was constituted the metropolitical see of all England. This monarch, having given a favourable reception to St. Austin, and his forty monks, who landed in the isle of Thanet in the year 597, was pleased to assign for their residence that part of the ancient Durovernum which is now called "Stable-gate," and which had formerly been a kind of chapel, or oratory for the royal family, where they had been accustomed to worship, and sacrifice to their gods. The missionaries entered the town in procession, singing a hymn. They were first restricted to the precincts, and, though zealous in their ministerial functions, did not make much progress in converting profelytes, till the king assumed, and recommended Christianity. This example produced numerous converts; and some monkish chroniclers do not hesitate to assert, that 10,000 persons of both sexes were baptized in the river Swale in one day. This is too improbable to be credited in the present age. Augustin having, however, completely established himself here, dedicated an ancient church to the honour of Christ, and Ethelbert founded an abbey, which was afterwards called St. Augustin's, the site, &c. of which has since been occupied by the bishop's palace. (See AUGUSTIN, vol. iii.)

Canterbury is particularly distinguished for its military, as well as ecclesiastical fame. Successively occupied by the Romans, Saxons, Normans, &c. it became the scene of repeated sieges and battles in the respective wars of each nation. It possessed a castle at the Norman Conquest, as it appears from the Domesday-book that the conqueror obtained it in exchange from the archbishop and abbot of St. Augustin's. The outer walls, and valla, appear to have inclosed an area of about four acres of land. Nearly the whole of this fortress has been destroyed, and its fosses filled up. The walls and gates, which formerly surrounded the city, have nearly suffered the same fate. Some of the latter remain, and parts of the former still retain their original characteristics. The whole extent of the wall measured nearly one mile and three quarters in circumference. Its thickness, on a medium, is about six feet, and at certain intervals were formerly twenty-one fortified towers. Without, there was a deep foss, nearly 150 feet wide, which environed the whole. The different entrances to the city were protected by six fortified gates, each of which gives name to the respective wards, or parts of the city, wherein they are situated. Besides these, there were some smaller passages through the walls, called posterns. West-gate stands on a bridge, which crosses the river Stour, and is the largest of these structures. It consists of two lofty spacious towers, embattled, portcullised, and machicolated, and is now used as the city prison. Archbishop Sudbury is said to have built this gateway, and the wall which proceeded from it northward on the bank of the river. Further north, is a small postern entrance, and near it is a large pile of building, called the Abbots-mill, the machinery of which was constructed principally from designs, by that great engineer, the late John Smeaton. The Northgate is very peculiar and remarkable, from having a long narrow church over it, which takes its name from the gate. Next to this, eastward, was Queningate, in which part of a Roman arch may yet be discovered on the outside of the wall. Near this is a postern, which is occasionally opened for the convenience of the deanery, and some of the prebendal houses. Burgate, and St. George's gate, are in the eastern side of the wall. The latter is directly opposite to Westgate, and is constructed and fortified in the same manner. In each tower of this gateway is a cistern, from which pipes issued, to convey water to different parts of the city. Besides these, there were nine other gates, which belonged to the cathedral and to the monastery.

monastery. Some of these are distinguished for their architectural ornaments; particularly that of Christ-Church. This, says Mr. Somner, is a very goodly, strong, and beautiful structure, and, according to an inscription on the cornice, was built in the year 1517. The principal front of this building is highly enriched with niches, canopies, shields, and other ornaments. The most considerable building, and greatest ornament of Canterbury, is the cathedral church, dedicated to Christ. This magnificent and spacious edifice displays the various styles of architecture which characterized different ages from the eleventh to the sixteenth century. The Danes besieged this city in 1011, and on the twentieth day of the siege set it on fire, and completely consumed the cathedral. Egelnoth, or Agelnoth, the archbishop who governed the see from 1020 to 1038, refounded, and made considerable progress in rebuilding this structure, which was again burnt in 1067. The present edifice appears to have obtained its foundation from archbishop Lanfranc, who was invited from Normandy by the Conqueror, in 1073. He is said to have completed the building, according to the then prevailing Roman style, in the course of seven years. In consequence of accidents by fire, and the dilapidations of time, different subsequent archbishops made various alterations, additions, and improvements: but to particularize the whole would exceed our due limits. One or two prominent circumstances must suffice for the present work. Further, and very detailed particulars may be found in Dart's "History of Canterbury Cathedral;" and in Gosling's "Walk in, and about Canterbury." In 1130, the new choir, built by archbishop Anselm, was dedicated with great solemnity in the presence of king Henry I. and his queen, David, king of Scotland, and many of the nobility of both kingdoms. On the 29th of December, 1170, archbishop Becket was barbarously murdered at the foot of the altar. He was buried here, where a sumptuous shrine was erected to his memory, and the monks having canonized him, his tomb was resorted to by an innumerable concourse of pilgrims from all parts of christianized Europe. This circumstance gave more extensive celebrity to Canterbury than any other event, and from that period the place continued to increase in monastic buildings and inhabitants, till Henry VIII. dissolved the bigotted delusion and the religious foundations at once. Erasmus and Stowe have each given a particular description of Becket's shrine, from which it appears that besides a coffin of gold, there were many jewels, &c. employed to decorate the remains of this saint. (See BECKET, vol. iv. p. 1.) The present cathedral consists of a nave, aisles, choir, transepts; two towers rising at the west end, one rising from the centre, some private chapels, or oratories, a chapter-house, cloisters, &c. Some of these buildings display much skill and beauty in their architecture, and some are further ornamented by many ancient and curious monuments. Among the latter may be noticed those of Henry IV. and his queen; Edward the black prince; cardinals Chaiton and Pole; archbishops Courtney, Chicheley, Bourchier, Walter, Reynolds, Kemp, Stratford, Peckham, Warham, Langton, and Sudbury; besides many others erected to the memory of eminent and distinguished characters. At a short distance east of the city walls, are the remains of St. Augustin's monastery, which was certainly the first Christian establishment in Great Britain. This was first built in 978, and though at first only a small foundation, soon increased in extent and revenues. Patronized by a king, and under the government of a man like Augustin, it attracted the company and property of numerous devotees from all parts of the converted island; and in proportion as Christianity was extended, so was the sacred fame of this place propagated.

At the dissolution, Henry VIII. seized the town, and intended to make it a palace for himself. It was afterwards granted to cardinal Pole; and in 1573, queen Elizabeth kept her court here in her progress through Kent. The boundary wall inclosed about sixteen acres of land. Some of the remaining buildings are appropriated to a brewery, and its fine entrance gate-way, though still a beautiful object, is gradually crumbling away.

Canterbury formerly contained seventeen churches and parishes within the walls, and three in the suburbs; but of these only fifteen remain. The Jews, Presbyterians, Quakers, Methodists, and Baptists, have each their respective houses of worship. Among these buildings we may particularize the following, as having something beautiful or curious to entitle them to the notice of the inquisitive traveller. St. Martin's church, being composed partly of Roman brick, is considered the most ancient building in the city. St. Dunstan's church is a large, handsome structure. St. Margaret's church contains an ecclesiastical court, where the archbishop, archdeacon, &c. hold their several visitations; and where various causes relating to ecclesiastical affairs are tried. This city is provided with many other public edifices; and its hospitals and other charitable establishments are numerous. Here are two public libraries, a prison for East Kent, a free grammar school, a theatre, assembly rooms, and a large guild-hall, which, besides containing several convenient apartments, is embellished with some portraits of persons who were benefactors to the city. The city workhouse was established by act of parliament in 1728. The name of Chaucer, and his Canterbury tales, with the Chequer inn, which was at one time occupied by our veteran poet and his fellow-pilgrims, will long be associated in the memory of all lovers of old English poetry.

The corporation of the city consists of a mayor, recorder, twelve aldermen, a chamberlain, town-clerk, twenty four common council men, and some inferior officers. It sends two members to the imperial parliament, who are elected by the freemen, of whom there are resident, and non-resident, upwards of 1600. An act of parliament for paving, lighting, and watching the city was obtained in 1787, since which time the appearance of Canterbury has been materially improved, and its local advantages greatly augmented. The road-way of all the principal streets is paved with Guernsey pebbles, and the foot-paths with Yorkshire squared stones.

Canterbury is seated in a fine valley on the banks of the river Stour, which, dividing itself into different channels, thus forms five or six islands, some of which are built on, and are united to other parts of the city by bridges. At the southern side of the walls is an artificial conical eminence, called Dane John Hill, or Dunge-Hill. This mount and its vicinity having been judiciously planted, and laid out in pleasant walks, is thereby rendered a very attractive and delightful promenade to the citizens. The principal manufactories of the city are for worsted, silk, and cotton, and here is a manufactory for blending silk and cotton, or silk and worsted, which is known by the name of Canterbury muslins, or stuffs. In the environs of the city are numerous hop plantations. See KENT.

Canterbury being a county in itself, its magistrates have authority to determine all disputes at law between the citizens, and to try capital offences. On these occasions the mayor sits as judge, attended by the recorder, and the bench of aldermen. This city is 55 miles east from London, and has markets on Wednesdays and Saturdays, besides several fairs. The houses in 1800 amounted to 1799, and the inhabitants to 9000. Gosling's "Walk in and about the City of Canterbury,"

bury," 12mo. 4th edition. Haisted's "History of Kent," 10 vols. 8vo. "Kentish Travellers Companion," 12mo. 4th edition. King's "Observations on ancient Castles," Archæologiæ, vol. iv. p. 392, &c. Dart's "History of Canterbury Cathedral," fol.

CANTERBURY, a township of America, in Rockingham county, New Hampshire, situated on the eastern bank of Merrimack river, 14 miles N. by W. from Concord, 45 N.W. from Exeter, and 54 from Portsmouth. It contains 1038 inhabitants.—Also, a township in Windham county, Connecticut, on the west side of Quinnabang river, which separates it from Plainfield; 7 miles E. by S. from Windham, and about 10 or 12 N. from Norwich.

CANTERBURY Bells, in *Botany*. See CAMPANULA TRACHELIUM and GLOMERATA.

CANTERII, or CANTHERII, in *Ancient Architecture*, rafters or joists of a house, which reach down from the ridge to the eaves.

CANTH, in *Geography*, a town of Silesia, in the principality of Breslau, on the Wislitz; 12 miles S.W. of Breslau.

CANTHARÆ, among the *Ancients*, a kind of candle-flick. See BRANCH.

CANTHARELLUS, in *Botany*, (Juss. 4. Merulius, With.) See AGARICUS and MERULIUS.

CANTHARELLUS, in *Entomology*, a species of STAPHYLINUS, of a black colour, with the wing-cases glaucous, and yellowish at the tip. Inhabits Sweden. *Gmelin*.

CANTHARIAS lapis, in *Natural History*, a name given by some writers to a fossil substance supposed to resemble a beetle. We sometimes meet with parts of the ichthy-peria or bony parts of fishes, which are ridged longitudinally, much in the manner of the outer wing of some of the beetle tribe; and from their size and shape, which is an oblong, or oval one of the bigness of a common beetle, and sometimes of the largest, and at others of the very smallest kinds; these have been called by some, petrified beetles and *cantharia lapides*; others have extended the name to such species of amber as have in them the body or any fragment of the beetle of any species.

CANTHARIDES, in the *Materia Medica*, are beautiful green flies with a golden burnish, found in the south of France, in Spain and Italy, of very important use in the *Materia Medica*. (For the natural history of this fly, see *MELOE Vescicatorius*). The cantharides of Italy are the largest, but the Spanish are accounted the best, and are the most used, whence the insect is also commonly known by the name of *Spanish Fly*.

When these flies appear in swarms, they are accompanied by a very distinguishable and fetid smell like that of mice, and this effluvia is so powerful, when proceeding from a large swarm, that persons exposed to it, experience symptoms of strangury, and ardor urinæ, pain in the eyes, and violent itching over the body.

The common way of collecting these insects is, to spread cloths under the trees containing them, to shake them down, and then kill them by putting them on a hair sieve and exposing them to the vapour of boiling vinegar, or else (which is the commonest mode) simply to immerse them in vinegar and water. They are then dried thoroughly, either in the sun or in airy chambers, being frequently turned by the hands armed with gloves. They are then well and carefully packed in close wooden barrels lined on the inside with paper. The insect, when well dried, is so light as to weigh no more, on an average, than about a grain and a half.

Cantharides in this state will keep well for a considerable time, and if in close vessels, they hardly acquire any smell, but in open vessels and in the damp, they putrify in some

degree. They are liable, however, notwithstanding their very corrosive quality, to be attacked by very small worms, which gradually crumble them to powder in every part except the wings. The acrid quality, however, is not very materially injured thereby, and remains for a great length of time, though slowly diminishing in intensity.

The singularly acrid property of cantharides has led several chemists to endeavour by chemical analysis, to determine in what principle it resided. Thouvenell's experiments on this subject are of some importance. This chemist found four distinct substances in cantharides, some of which are doubtless still further decomposable. After softening them with warm water, he submitted them to strong pressure, which left behind about half the weight of a parenchymatous matter that was not further attended to. Hot water then extracted about $\frac{1}{3}$ of the whole weight of a yellowish red and very bitter substance, which gave an acid by distillation, and melted out a quantity of yellow oil which floated at top. This latter concretes by cooling, and has a very acrid taste and the peculiar smell of the insect. Heated with ether, it separates into two distinct concretescible oily matters, that are soluble in ether, being green, waxy, and peculiarly acrid, and the other untouched by this menstruum, remaining yellow. The green oil is about $\frac{1}{10}$ of the whole, and the yellow oil after this has been separated, amounts to about a fifth. All the active medicinal properties have been supposed to reside in these oils, and especially the green. The truth of this supposition is somewhat questionable to the full extent, since this oil is insoluble in water, which liquid certainly extracts some acrid properties from the insect, but it is yet highly probable, that it is the most active portion. This concrete oil being very difficult of putrefaction and more of the nature of resin, will also explain why the virtue of the insect remains so active after very long keeping. The whole of the active power of the insect, both that which resides in the oil and in the extract, is readily dissolved by alcohol diluted with as much water; and in this way the tincture of cantharides is prepared. Something further, however, may probably be done on this subject by an able chemist who should pursue this research.

Cantharides have a peculiar and somewhat nauseous smell. When taken into the mouth, no taste is at first perceived, but after a while, a sensation of burning comes on which is very durable. Taken into the stomach even in the dose of two or three grains, it produces most excruciating pain and sensation of burning, inflaming and excoriating the whole intestinal canal, and producing death with great agony. It also has a peculiar tendency to affect the urinary organs, occasioning very acute pain and burning on passing the water, often attended with blood, and also with strangury, or a painful difficulty of passing it. These affections of the bladder often are felt in a slighter degree after the external use of this insect.

The chief use to which cantharides are applied is, in BLISTERS, as has already been fully described under that article, and need not here be repeated. No other known substance answers the effect so certainly, so extensively, and on the whole, so easily to the patient, and hence this insect is one of the most valuable articles of the *materia medica*. Much refinement has been attempted in the composition of the different blistering plasters, and many additions have been proposed, but with very dubious advantage. It does not appear that any substance can add to the vesicating power of the fly when fresh and good, and when a *diminished effect* is wanted, the simplest and surest way is, either to lessen the quantity of the cantharides or the usual time of its application.

The

The internal use of cantharides is justified by sound experience, but on account of its extreme and dangerous activity, it should be employed with great caution. The urinary affection is generally the first and most unquestionable sign of an excessive dose. It is given internally sometimes in dropsy, but chiefly in debility of the urinary and generative organs. Camphor is said to check the disposition to strangury, but this is extremely doubtful. Opium is more certainly an useful addition. The dose of the fly in substance is about half a grain, and can seldom be borne oftener than once, or at most, twice a day. The tincture of cantharides is also used internally in doses of from ten to twenty drops. Besides the above-mentioned uses of this medicine, the tincture has often been found of singular service joined with decoction of elm-bark or sarsaparilla, in obdurate cutaneous diseases. The tincture is used externally as a stimulating application.

CANTHARIFERA, in *Botany*, (Rumph. Amb.) See NEPENTHES DESTILLATORIA.

CANTHARINUS, in *Entomology*, a species of CERAMBYX, (Saperda Fabr.) that inhabits Germany. The colour is ferruginous: thorax cylindrical, with the antennæ and legs black. Fabr. Linn. &c.

CANTHARINUS, in *Entomology*, a species of CIMEX. The colour of this insect is black: thorax armed with a single tooth, and marked with a white circle: wing-cases cinereous, with four yellow spots: scutell yellow. A native of Denmark. Muhl. Zool. Dan.

CANTHARIS, in *Entomology*, a genus of Coleopterous insects distinguished by having the antennæ filiform: thorax in general margined, and shorter than the head: wing-cases flexile: sides of the abdomen edged with folded papillæ. Linn. &c.

The species of this genus Gmelin divides into three sections, the first containing those which have four hatchet-shaped feelers; the second, those with filiform feelers, the last joint of which is fetaceous, (or true Malachius of Fabricius); and the Lymexyla, or those having the anterior feelers projecting, the last joint but one, with a large ovate cleft appendage, and the last joint ovate and acute. The species are these:

Section 1, viridescens, fusca, marginella, media, haematostoma, punctata, dichroa, multicolor, livens, distincta, exulta, livida, rufa, obscura, limbata, lateralis, smaragdula, biguttata, minima, cardiacæ, albicans, testacea, atra, marginata, bimaculata, pallipes, pallida, ruficollis, flavipes, melanocephala, bipunctata, angulata, nigra, pulicaria, canescens, coccinea, bicolor, bilineata, trilineata, altica, oculata, collaris, cuprea, argentea, janthina, americana, rufipes, berolienfis, fulva, serrata, tropica, fonchi, caspica, flavo-veola, violacea, virescens, lepturoides, nigripes, melanura, histrio, picea, chalybea, tricolor:

Section 2, ænea, bipustulata, hæmorrhoidalis, viridis, sanguinolenta, cyanea, pedicularia, nemoralis, fasciata, equestris, ochropus, chrysomeloides, cæruleocephala, suecica, Herbstii, erythromelas:

Section 3, abbreviata, proboscidea, barbata, navalis, faxonica, morio; which see respectively.

Obs. The Fabrician genus *Cantharis*, includes only those Linnæan species of the genus that have four hatched-shaped feelers: jaws bifid; lip entire; and antennæ filiform.

CANTHARIUM, in *Ancient Geography*, the most western promontory of the isle of Samos.

CANTHARUS of a *Fountain*, among Roman writers, denotes the part, or apparatus, out of which the water issued.

It was made in divers forms, sometimes in that of a shell,

at other times in that of an animal, which yielded water at its mouth, eyes, and the like.

CANTHARUS, in *Ecclesiastical Writers*, denotes a fountain, or cistern, in the middle of the atrium, before the ancient churches, wherein persons washed their hands and faces before they entered.

CANTHARUS, in *Ichthyology*, a species of SPARUS. The tail is immaculate, and the body lineated longitudinally with yellow. Linn. Arted. &c. Inhabits the Mediterranean.

CANTHELEA, or CANTHALIA, in *Ancient Geography*, a maritime town of Africa, in the territory of Curubis, and in the vicinity of Carthage. This town is said to have received its appellation from the Pagan deity Saturn; since, according to Sanchoniatho and Damascius, the word *el* in the Phœnician tongue had a particular relation to that deity. In confirmation of this opinion it is added, that there was a town in that place called "Vicus Saturni," the street or town of Saturn, where Jerome is said to have lodged during his exile in Curubis.

CANTHERII, in *Antiquity*, a general name applied by the Romans to horses used on many different occasions, but which was always understood to mean "geldings." Many unsatisfactory conjectures have been formed concerning the etymology of this word. The best explanation, says Berenger (Hist. &c. of Horsemanship, p. 71,) seems to be that which deduces it from the Greek, καθελιον, canthelion, which, by no unusual change of one letter for another, may be made "cantherion;" signifying, in its original sense, a pack-saddle; and as it was usual to castrate the "cantherii," or pack-horses, in order to make them gentle and quiet, it became a custom to call all castrated horses, "cantherii," though appointed to other services beside that of carrying packs or burdens. In process of time, people, who, for various reasons, rode on horseback, began to prefer these cantherii, or geldings, for their calmness of temper, to other horses.

CANTHI COLPUS, or IRINUS, in *Ancient Geography*, a gulf of India, according to Ptolemy, into the northern part of which the river Indus discharged itself.

CANTHI STATIO, a port of the Indian sea, to the west of the most western mouth of the river Indus.

CANTHIUM, in *Botany*, a genus formed by La Marck and adopted by Jussieu, for two plants nearly allied to Gardenia and Coffea; but stated by La Marck to differ from the former in their two-seeded berries, and from the latter, in their short flowers and simple stigma. One of them is Gardenia spinosa of the younger Linnæus, G. Dumetorum of Willdenow, which see; for the other, see WEBERA Tetrandra. As La Marck has not inserted this genus in his Illustrations, he appears to have since formed a different judgment concerning it: but as the detail of species in that work is not yet completed, it cannot be determined in what manner he would now dispose of these two plants. We have followed the arrangement of Willdenow.

CANTHUS, in *Anatomy*, the junction of the superior and inferior eyelids. Hence there is an internal and an external canthus. These parts are also called the angles of the eye; that which is towards the nose being termed the inner or greater angle; and that which is towards the temple, the outer or lesser angle of the eye.

CANTHUS, in *Chemistry*, the lip of a vessel; or that part of the mouth of a vessel, which is a little hollowed, or depressed, for the easy pouring off a liquor.

Hence, to pour by decantation, is to pour through that place.

CANTHUS, in *Entomology*, a species of PAPILIO (Dan. Felt.).

Figs.) that inhabits North America, the wings of which are entire, and fuscous above: anterior pair immaculate: on the upper surface of the posterior ones six ocellar spots. *Fabr. &c.* Obf. This insect is noticed by Linnæus (*Amoen. Acad.*) under the name of *Papilio Eurydice*, and it is also *Papilio Argante* of Cramer.

CANTI, *Carnascialeschi*. Songs sung through the streets of Florence in the Carnival, by persons in masks, during the time of Lorenzo il Magnifico. These songs, after the manner of the Greek *scolia*, were applicable to persons of different trades and occupations; among the rest there is one for those who played on the rebec, the trumpet, and various instruments of music used in the German troops, called by the Italians, *Lauzi*. The first of these songs that were performed in this manner, were set by Arrigo Tedesco, Maestro di Cappella of the church of St. John, and a musician of great eminence, of whose compositions various specimens are preserved by Glarianus. Ant. Francesco Grazzini, commonly called, *Il Lasca*, collected and published the words of these songs in 2 vols. 8vo., under the title of *Tutti i trionfi, Carri, Mascherate o Canti Carnascialeschi andati per Firenze dal tempo del magnifico Lorenzo de' Medici fino al anno. 1559*. The poetry of these songs is still in great favour with the Florentines.

CANTICLE, a hymn or pious song: as, *the Song of Songs*, by Solomon. The first and most ancient canticles were composed on occasion of great and memorable events, and should be ranked among the most ancient historical monuments. Canticles were sung in Chorus, and often accompanied with dances, as appears in the sacred writings, where the most considerable composition of this kind is the *song of songs*, which some authors imagine to be an epithalamium, composed by Solomon on his own nuptials with the daughter of the King of Egypt. But theologians find under this allegory, the union of Christ and the church. M. Cahusac saw nothing in the *song of songs*, but a regular opera: the scenes, recitatives, duets, chorusses, every thing necessary to an opera, according to him, is contained in this *canticle*, and he doubts not but that it has been represented. *Roussseau*.

CANTICLES, or *the Song of Songs*, in *Biblical History*, a Hebrew mode of expression to denote a song superlatively excellent in style and sentiment. Of this ancient poem the author is asserted, by the unanimous voice of antiquity, to have been Solomon; and this tradition is corroborated by many internal marks of authenticity. In the very first verse it is said to belong to Solomon: he is the subject of the piece, and the principal actor in the conduct of it. Allusion is made to the rich furniture of his palace, chap. i. 5.; to the horses and chariots which he purchased of Pharaoh king of Egypt, i. 9. 1 Kings x. 28, 29.; to Amminadab, who was eminent for such chariots, and who married one of Solomon's daughters, vi. 12. 1 Kings iv. 11.; to his building of the temple, under the figure of a palanquin or couch for his bride, iii. 9, 10.; to the materials of which it was formed brought from Lebanon and other hills, iv. 8. In a word, all the leading circumstances of Solomon's life in a religious view appear to be alluded to, or implied in this ancient poem, and therefore render it probable that it was a production of some writer in his age, if not his own composition.

That the Song of Songs, from the most early period, was deemed a sacred book, and ranked with the Hagiographa of the Jews, and thence received among the canonical books of the Old Testament, may be inferred from the following considerations. A translation of it is ascribed to the seventy Jews, who flourished about 300 years before Christ, and

which still forms a part of the Alexandrian version. With the same conviction of the sacred character of the work, it was rendered into Greek, in the second century, by Aquila, Symmachus, and Theodotion. Origen, on the authority of the Jews, contemporary with him, and whom he was in the habit of consulting respecting the authority and literal import of their sacred books, inserted it in his *Hexapla*, and wrote some homilies upon it, explaining its mystical sense, which have in part been translated into Latin by Jerome. That the ancient Jews, without exception, considered it as a production divinely inspired, appears moreover from the allegorical signification annexed to it by the Chaldee paraphrase. Josephus, in his answer to Apion, lib. i. 38, gives a catalogue of the Jewish books, and includes in the third class of such as related to moral instruction the Song of Songs. See **BIBLE** and **CANON**. Eusebius, also, following his footsteps, makes it the fifteenth of that number. See his *Eccles. Hist.* lib. vi. cap. 25. From the Jewish synagogue the book of Canticles was received into the Christian church, without any doubt of its divine authority. This appears from Origen and Eusebius. It is cited by Ignatius, about the beginning of the second century, as a book of authority in the church at Antioch. It is included in the canon of the apostles. See **CANON**. And in the apostolical constitutions, a passage from the Canticles is quoted. *Con. vi. 13. 18.* See **CONSTITUTIONS, apostolical**.

Though the Song of Songs comes down to us recommended by the voice of antiquity, its divine authority has been called in question by many writers in modern days. Whiston thinks it a dissolute love song, composed by Solomon when advanced in years, and degenerate in practice; and that therefore it ought to be excluded from the canon of the sacred books. Taken indeed in its primary and literal sense, it must be considered as describing a royal marriage, and may therefore be denominated an *epithalamium* or *hymeneal song*. The celebrated Michaelis supposed that the object of it was to teach God's approbation of marriage. But the ideas of Harmer appear much more rational, who, though unwilling to give it the name of *epithalamium*, thinks it a marriage song to be explained by compositions of a similar nature in eastern countries. "What can be more likely," says he, "to lead us into the literal sense of an ancient nuptial poem than the comparing it with similar modern productions of the East, along with antique Jewish compositions of the same kind?" Bossuet, bishop of Meaux, was of opinion that this song was to be explained by the consideration, that the Jews were wont to celebrate their nuptials for seven days together, distinguished from each other by different solemnities: and this notion has been adopted by the author of "A new Translation of Solomon's Songs, with a Commentary and Annotations." The principal objection to this opinion is, that the conduct of the poem does not admit of such a distribution; and the distinguishing each day by some distinct ceremony is a mere supposition unsupported by fact.

The elegant and learned bishop Lowth devotes two of his *Preflections* to an examination of this poem, and he determines it, with Bossuet, to be a *sacred drama*, though deficient in some of the essential requisites of dramatic composition. Sir W. Jones, from his knowledge of Eastern poetry, was led to compare some parts of it with similar productions among the Arabians, and delivers it as his opinion, that it is to be classed with the Hebrew idyls. *Poet. Asiat. Com.* p. 92. Supported by the high authority of this illustrious scholar, Mr. M. Good, in an elegant metrical version, with which he has favoured the public, considers the Song of Songs

Songs as forming not one continued and individual poem, but a series of poems, each distinct and independent of the other; and he denominates them *sacred idyls*. "The Song of Songs," he says, "cannot be one connected epithalamium, since the transitions are too abrupt for the wildest flights of the Oriental muse, and evidently imply a variety of openings and transitions; while, as a regular drama, it is deficient in every requisite that could give it such a classification." In opposition to this it may be remarked, that the subject of the poem, from beginning to end, is the same; the personages, introduced as speakers, are the same; and, though to a modern reader the transitions in many places may seem abrupt, and the thoughts unconnected, the conduct of the piece is not suspended, but carried on under a fable regularly constructed, and terminating in a conclusion interesting and unexpected. The apparent want of connection in the sentiments of an ancient dramatic composition must be manifest; and it is the business of a critic to remove those causes, by pointing out the place of representation; by assigning to the proper characters their respective speeches; by unfolding in the history of the times, the event on which the fable is constructed; by marking the commencement and close of the several acts or stages of the action: in a word, by conveying his own imagination, and that of his reader, to the place of exhibition, and thus calling the eye, as it were, to the assistance of the ear in developing the unity of the subject, and supplying the smoothness of the transitions.

Having thus produced the sentiments of others respecting the nature and object of the Canticles, we shall next briefly state those of an ingenious friend, who considers it, for the reasons which he has adduced, as a parable in the form of a drama.

First, When closely examined, it will appear to possess all the essential qualities of a *drama*. The marriage of Solomon with the daughter of Pharaoh, (as related 1 Kings i. 1.) a political event which, from the personages concerned in it, would be interesting to the Jewish nation, was, as such, proper to furnish the fable of it. The writer is entirely left behind the curtain, and the whole of the composition is brought forward before the reader in parts between the speakers. The *dramatis personæ* are Solomon, the bride, her attendants, and the virgins of Jerusalem. It should be observed, though the fact has indeed been overlooked by the critics, that all advance is made by the lady herself. She comes to his palace *unfetched*, and apparently *unsolicited*. Finding him not there, she goes in search of him, intreats to be received into his embrace; and when, without denying, he eludes her intreaties, she pursues him in the ardour of her affection almost beyond the bounds of female delicacy and modesty. On the contrary, the royal spouse is cold at heart, and distant, prone to recede, and to intrigue with his favourite concubines, but anxious to conceal his indifference and infidelity under laboured encomiums on the beauty of his spouse. The action is complete, possessing a beginning, a middle, and an end, and composed of scenes, the shifting of which, if observed by a modern reader as by an ancient spectator, would have preserved the conduct of the piece uniform and consistent. The plot, it must be allowed, is very simple, the intricacies of it arising only from those unforeseen impediments which were thrown by rival beauties in the way of the royal bride, and which threatened to deprive her of the object of her attachment. The catastrophe is the triumph of honourable love over the allurements of seduction, and the security of virtuous enjoyment over the torments of jealousy and illicit fruition.

Secondly, Considered as a *parable*, like other parables,

while it conveys a literal sense interesting and appropriate, it conveys likewise a religious lesson of supreme importance. Now the method of decyphering a fable or parable is, not by seeking under the veil of the allegory certain maxims of recondite wisdom, which bear no resemblance to the literal sense, but by facts generally known and fully understood: nor is the interpretation to be deemed *true*, unless, as in the case of the parable of Nathan or that of the sower, there subsists an obvious and characteristic analogy between the simple and the metaphorical acceptation. On this principle, it is apprehended that, in the parable of the Canticles, the bride means the *Jewish religion*, and the royal spouse the *Jewish nation*, represented under the name and person of their ruler and chief; and the object of it is to delineate, under images borrowed from the connubial state, the conduct of the Israelites at large, and that of Solomon in particular, in respect to their knowledge and worship of Jehovah. In proof of this position, it will be necessary to specify a few leading particulars.

1. The relation subsisting between Jehovah and the Jews, as his chosen people, is usually described, in the Jewish writings, in language expressive of the relation between a husband and the woman who is the object of his peculiar affection and choice. See Isa. liv. 5. Jer. iii. 1. Ezek. xvi. xxiii. Hof. i. Mat. ix. 15. xxv. Rev. xix. 7.

2. The description, given in the poem, of the royal bride consists of those figures and allusions which, in other parts of the Jewish scriptures, are employed to delineate the character of *true religion*. Thus she is said to be a *fountain*, to be a *garden*, to have a *vineyard*, to be *more delicious than wine*. See Isa. v. 1. Mark xii. 1. Isa. xii. 2, 3. John iv. 14. vii. 37. Pf. xix. 10.

3. While the royal lover is lavish of his encomiums on the beauty of his bride, he was cold and faithless, and all advance is made by herself. This delineates with exactness the character of the Jews, with respect to their religion. It was bestowed upon them unasked and undeserved. While loud in praise of their worship, they were ever prone to the idolatry of their neighbours; and the God they were forsaking ceased not, as it were, to pursue them, and to solicit their return to him. We read of Solomon, (1 Kings i. 1—7.) that the strange women he married were the means of seducing his heart from God; and the bride seems to have been sensible that the virgins, with whom he associated, were the cause of alienating his affections from her, and she repeatedly intreats them *not to stir up nor awake her beloved*.

4. Solomon built a temple in which the knowledge and worship of the true God might be cultivated; and the service of the temple was appointed by the wisdom of heaven to be but an introduction to the more rational service of the Christian church. For this reason, the temple might be considered as the *cradle* or *couch* in which the Jewish religion was to be nursed, and, as it were, to be conveyed home to her parent's house; that house of which God was the owner and author, and of which Christ was the chief corner-stone. Accordingly the royal lover is represented as making a couch for the bride. In this grand palanquin she is conveyed home with her husband; and here she expects to enjoy his undivided attachment, without any apprehension from the seductive arts of her rivals. And it is certain that those of the Jews who passed over from the temple to the Christian church never afterwards relapsed to idolatry, but ever remained faithful to the worship of the true God.

5. The temple being made of the wood of Lebanon, the bridal couch is, for this reason, represented as made of the same timber. Hence with much propriety the royal lover invokes his bride to come from Lebanon, and other hills,

whence the materials for the temple were brought ; and hence too, with equal propriety, the language in which the husband celebrates the accomplishments of his spouse is copied from that temple which was devoted to her service.

6. When they arrived in the parent's house, she informs her husband, " We have a sister who is little, and hath no bosom." Which means that, when the Jewish temple was exchanged for the church of Christ, Judaism itself pointed out the gospel dispensation, which being in its infancy encumbered with rites and ceremonies, had not yet all its vigour and purity. To the information of the bride respecting her younger sister the king replies, " If she be a wall, we will build for her a palace of silver ; and if she be a door, we will enclose her with boards of cedar." Which is to this effect : " If the new religion, the younger sister, be intended as a wall or an additional security of the old ; if the religion of the gospel prove an auxiliary to the service of the temple, we Jews will erect for her portion a splendid residence ; we will adopt her as a beautiful appendage of Judaism : but if, on the other hand, she will abolish the Levitical code, and throw open a door to receive the Gentiles to the privileges of the Jews, we will reject her, and endeavour to close up the breach which she has made in our dispensation." The answer of the bride is remarkable : " *I am a wall*," by which she delicately hints that she was the means of enclosing the chosen people of God, and of separating them from the idolatry of their neighbours ; but that her younger sister was intended to remove this wall of separation, and to unite the Gentiles with the Jews in the knowledge and worship of the true God."

7. The gradual expansion of revelation, from the first dawn of it in the garden of Eden till it reached its meridian effulgence, in consequence of the death and resurrection of Christ, is thus beautifully portrayed in the character of the bride : " Who is she that looketh forth as the morning, fair as the moon, bright as the sun, and serene as the starry hosts ?"

Finally, The royal husband addresses his bride as being at the same time his sister, *My sister, my spouse*. These two inconsistent relations are now easily explained. The father of the husband, the Creator of the Jews, was also the author of their religion. The bridegroom and the bride, being descended from the same great Parent, were also a brother and sister.

The metaphorical sense thus capable of being put upon every part of this poem, justifies the high appellation of *The Song of Songs*, which has ever been given it. It accounts also for its being regarded, by Jews and Christians, as a *sacred composition*, and for its reception first into the Jewish, and then into the Christian canon. On its first publication its allegorical import must have been generally understood ; and it was natural that, as with the process of time it became unintelligible, it should still retain the high rank and estimation which at first it so justly acquired. It was also equally natural in the first Christian writers, on receiving it into the canon of the Jewish scriptures, but without knowing the true signification of it, to interpret it as referring to Christ and his church. The interpretation, however, though adopted by most modern divines, has only involved it in mystery, fancy, and absurdity ; and the consequence was that its claims to inspiration have been called in question ; nor is there any means of restoring it, in the estimation of rational critics, to the sacred writings, but by disclosing the beautiful lesson of religious wisdom concealed under the veil of its allegory. The epilogue, respecting the younger brother and sister, demonstrates that its views terminate in the temple service. While, at the same time, the allusion at the close to the rise of the

gospel, and the conversion of the Gentiles, which took place so many hundred years after Solomon, proves that the author was actuated by divine inspiration.

CANTICUM, Latin, in *Music*, a motet, anthem, or sacred song.

CANTII, in *Ancient Geography*, a people of Albion, or Britain, who inhabited that part of the country which from them was called *Cantium*. See CANTUUM.

CANTILENA, in *Music*, an Italian word equivalent to melody, the treble, the principal part of a composition, opposed to the ripieno, or under parts, either in instrumental or vocal music.

CANTILLANA, in *Geography*, a town of Spain, in the country of Seville, seated on the Guadalquivir ; 11 miles N.W. of Carmona.

CANTIMARONS, or CATIMARONS, a kind of floats or rafts, used by the inhabitants of the coast of Coromandel to go a fishing in, and to trade along the coast. They are made of three or four small canoes, or trunks of trees dug hollow, and tied together with cacao ropes, with a triangular sail in the middle, made of matts. The persons who manage them are almost half in the water, there being only a place in the middle a little raised to hold their merchandise ; which last particular is only to be understood of the trading cantimarons, and not of those who go fishing.

CANTING-ARMS, among *Heralds*, are those arms which express their owner's surname. These answer to what the French call *armes parlantes* ; they are a sort of rebuses, and are never presumed to be noble. See ARMS.

CANTING-quoins, in *Ship Building*, the same as *cantic-quoins*. See CANT and QUOIN.

CANTIEBIS, in *Ancient Geography*, a town of Germany, placed by Ptolemy near the Danube.

CANTIUM, as it is called by Cæsar and Ptolemy, CANTIA of Bede, now Kent, derives its name and that of its inhabitants, most probably, from the British word " Cant," which signifies an angle or corner, and applied to this part of Britain from its form and situation. It is separated from the continent by a narrow sea, called by Solinus " Fretum Gallicum," but by Tacitus and Ammianus Marcellinus " Fretum Oceani," and " Oceanus Fretalis." The places of Cantium mentioned by the ancients are Durovernum, Durobrivis, Durolenum, Portus Rutupia, Portus Dubris, Regulbium or Regulium, and Portus Lemannus, now Canterbury, Rochester, Lenham, Richborough, Dover, Reculver, and Leine. Ptolemy reckons Londinum, London, among the cities of the Cantii ; but in this particular he was certainly mistaken. This was probably the first district of Britain which received a colony from the continent ; and it is no less probable that it had frequently changed its masters, by new colonies, who came over from time to time, and drove the inhabitants farther north. Amidst all its revolutions it retains its appropriate name, and it was transferred to all the successive tribes by which it was inhabited. At the time of the Roman invasion its inhabitants were evidently of Belgic origin, who had arrived at so late a period, that they differed in no respect from their countrymen on the continent. " The inhabitants of Kent (says Cæsar, Bell. Gall. l. v. c. 10.) are the most civilised of all the Britons, and differ but very little in their manners from the Gauls." This resemblance was owing to the proximity of their situation, which, being nearest to the continent, was most frequented by emigrants from thence. It was this situation, also, that exposed them to the first assaults of the Romans. Cæsar, in both his expeditions into this island, landed in Kent ; and therefore we may conclude, that the Cantii were principally concerned in the vigorous opposition that was made to his landing, and in the

several skirmishes and battles that were fought against him after his landing; particularly, they made a very bold but unsuccessful attempt upon his naval camp. Their resistance, however, was less vigorous on the next invasion of the Romans, in the reign of Claudius; for we learn from Dio (l. lx.) that Aulus Plautius, the Roman general in that expedition, traversed their country without seeing an enemy; and as they now submitted to the power of Rome without a struggle, so they continued in a state of quiet submission to it to the very last. Cantium, in the most perfect state of the Roman government, formed a part of the province which was called "Flavia Cæsariensis." Henry's Hist. vol. i. p. 253, 8vo.

CANTO denotes a part or division of a poem, answering to what is otherwise called a book. The word is Italian, and properly signifies song. Tasso, Ariosto, and several other Italians, have divided their longer or heroic poems into cantos. In imitation of them Scarron has also divided his *Gigantomachia*, and Boileau his *Lutrin*, into *chants* or songs. The like usage has been adopted by some English writers, as Butler, who has divided his *Hudibras*, and Dr. Garth his *Dispensary*, into cantos. A translator of part of Virgil's *Æneid*, has even subdivided a book of Virgil into several cantos.

CANTO, *Ital.* a song, part of a poem. *Il canto*, in *Musico*, implies the first treble of a vocal composition, in four parts. In a chorus of more than four parts, there is frequently a second canto; as *canto 2do*, the second treble. *Canto fermo*, plain chant, *canto Gregoriano*, the Gregorian chant, or the chant instituted by pope Gregory, written in the Roman missals, in square black notes, on three or four lines only. *Canto figurato*, florid counterpoint.

CANTOCRA, in *Geography*, a town of Piedmont, 22 miles N.N.W. of Turin.

CANTON, JOHN, in *Biography*, an ingenious natural philosopher, was born at Stroud in Gloucestershire, July 31, 1718, O. S.; and having, at an early age, made a considerable proficiency in mathematics, under the tuition of a schoolmaster in his native town, he was taken from school to learn the business of his father, which was that of a weaver of broad cloth. This employment, so unsuitable to his faculties and views, did not restrain his ardour in the prosecution of science; and his acquaintance with astronomy was at this time so considerable, that by the help of the Caroline tables he computed eclipses of the moon and other celestial phenomena. He also constructed several kinds of dials. In his favourite pursuits he encountered many difficulties and discouragements; but devoting those hours to study, which the family spent in sleep, and reduced to the necessity of secreting a candle for this purpose, he made such progress that he was able to construct, with a common knife, an upright sun-dial of stone, which served to shew not only the hour of the day, but the rising of the sun, his place in the ecliptic, and some other particulars. This dial was placed in the front of his father's house, and as it excited the admiration of several neighbouring gentlemen, it was the means of introducing him to their acquaintance, and of gaining for him an access to their libraries. In one of these libraries he found Martin's Philosophical Grammar, in the perusal of which he first acquired his taste for natural philosophy. In another library he met with a pair of globes, the use of which facilitated his solution of various problems. At this time he had the happiness to be introduced to the acquaintance and patronage of the Rev. Dr. Henry Miles, a dissenting minister at Tooting, near London, well skilled in natural knowledge, and a respectable member of the Royal Society. Mr. Canton accompanied Dr. Miles to London, in 1737, and after residing with him for some time, he articulated himself for five

years as an assistant to Mr. Samuel Watkins, master of an academy in Spital-square. Having recommended himself in this subordinate situation, by his ingenuity, application, and good conduct, he was taken into partnership by Mr. Watkins in 1742, and afterwards succeeded him in his school, where he remained till his death. The science of electricity had for some time engaged the attention of Mr. Canton; and after the discovery of the Leyden phial towards the close of the year 1745, he made it the object of his particular investigation, and in the following year his method of determining the quantity of electricity accumulated in it was communicated by Dr. William Watson to the Royal Society. His mode of doing this, as Dr. Priestley observes, in his "History of Electricity," had a near affinity to the discovery of Dr. Franklin. Towards the close of the year 1749, he assisted his friend Benjamin Robins, Esq. in his experiments for ascertaining the height to which rockets ascend, and the distance at which their light may be seen. In January, 1750, Mr. Canton communicated to the Royal Society his "Method of making artificial magnets, without the use of, and yet far superior to any natural ones." The discovery of this method had been made some time before; but Mr. Canton, from motives of delicacy, with respect to Dr. Gowin Knight, delayed the publication of it, till he was urged to it by Martin Folkes, Esq. This communication was soon followed in the same year by his being elected a member of the Society, and by his receiving its gold medal. In this year he was also complimented with the degree of Master of Arts, by the University of Aberdeen; and, in 1751, he was chosen one of the council of the Society. On occasion of the change of the style in 1752, he gave to the earl of Macclesfield several memorial canons for finding leap-year, the dominical letter, the epact, &c. which were afterwards published by Dr. Jennings in his "Introduction to the Use of the Globes."

In 1752, Mr. Canton had the honour of being the first person in England, who, by drawing the electric fire from the clouds, during a thunder-storm, verified Dr. Franklin's hypothesis of the similarity of lightning and electricity. In 1753 his paper, entitled "Electrical Experiments, with an Attempt to account for their several Phenomena," was read at the Royal Society. This paper, as well as another communicated to the Society in 1754, contains some curious facts and discoveries, of which an account will be given in the *History of ELECTRICITY*. Mr. Canton, in 1752, sent to the editor of the *Lady's Diary* a solution of the prize question for that year, explaining the phenomenon of the "shooting of stars." The answer was anonymous; but Mr. Thomas Simpson, who then conducted the *Diary*, sent the prize to Mr. Canton, accompanied with a note informing him that, though he had concealed his name, he knew him to be the author, because no one else could have answered the question. Our author's next communication to the public was a letter in the *Gentleman's Magazine* for September, 1759, on the electrical properties of the TOURMALIN; which see. In the same year the Royal Society received a paper, entitled, "An Attempt to account for the regular diurnal Variation of the horizontal Magnetic Needle, and also for its irregular Variation at the Time of an Aurora Borealis." Mr. Canton's observations on the transit of Venus were communicated to the Royal Society in November 1761; and in 1762, a letter addressed by him to Dr. Franklin was read, containing remarks on Mr. Delaval's electrical experiments; in December of the same year his curious paper entitled "Experiments to prove that Water is not incompressible" was also communicated to the Society. See COMPRESSION. These experiments, as they refuted the famous Florentine experiment, were carefully examined; and the conclusion

conclusion deduced from them very cautiously received. They were repeated before a committee of the Society, who professed themselves satisfied with their accuracy and with the fact inferred from them; and in consequence of their report, the council unanimously voted to Mr. Canton the gold medal, which was delivered to him on the 30th of November, 1765. In 1768 our author communicated to the Society, "An easy Method of making a phosphorus, that will imbibe and emit Light, like the Bolognian stone, with Experiments and Observations." See PHOSPHORUS. Mr. Canton was one of the committee of the Royal Society, who, in 1769, took into consideration the best and the most effectual method of fixing electrical conductors to preserve the cathedral of St. Paul's from damage by lightning: and the mode which they recommended has been put into execution. Our author's last paper, addressed to the Royal Society, was read in December 1769, and contained "Experiments to prove that the Luminousness of the Sea arises from the Putrefaction of its animal Substances." Besides the papers above recited, and which have been selected on account of their peculiar importance and utility, Mr. Canton wrote a number of others, which appeared in several different publications. The compiler of this article had the honour of intimate acquaintance with Mr. Canton for several of the last years of his life; and he can bear testimony from his own observation to the peculiar neatness and elegance of his apparatus, and to the accuracy and address with which he conducted his experiments. He can also testify with gratitude and pleasure to the urbanity of his manners, and to the readiness with which he communicated information to all who wished to receive, and who seemed disposed to derive any advantage from it. His death, of a dropsy in the thorax, probably occasioned by his sedentary and studious habits, at comparatively the early age of 54, in March 1772, was much regretted by all who knew him, not only as it deprived them of an esteemed friend, but as his decease was no inconsiderable loss to the interests of science, which he assiduously cultivated and improved. His wife, whom he married in 1744, and by whom he had several children, survived him. His eldest son, Mr. William Canton, succeeded him in the academy. Biog. Brit.

CANTON, in *Geography*, a quarter of a city, considered as separated and detached from the rest.

The word seems formed from the Italian *cantone*, a *square stone*, or *corner stone*.

CANTON is also more frequently used for a small country, or district, under its separate government. Such are the thirteen Swiss *cantons*; each of which forms a republic apart; but all are leagued together, and constitute what is called the Helvetic body. See SWISSERLAND.

CANTON, in the late organization of the French constitution, denotes a subdivision of a district, as the districts are subdivisions of the departments. See DEPARTMENT. Each canton is composed of a certain number of communes (see COMMUNE); and is comprehended within the jurisdiction of a justice of peace. The "assembly of canton" is composed of all the citizens domiciliated within the canton, and who are inscribed upon the communal list of the district. The first consul nominates the president of this assembly, whose functions last five years; and he is assisted by four scrutineers and a secretary. Each assembly of canton divides itself into sections, for the purpose of performing the functions that belong to it; and it proposes two citizens, from whom the first consul chooses the justice of the peace of the canton, and also two citizens for every vacant place of deputy. The justices of peace, and their deputies are appointed for ten years. In the cities consisting of 5000 persons the assembly of canton presents two citizens for each place

in the municipal council; and in cities, where are several assemblies of canton, each assembly is empowered in like manner to present two citizens for the same purpose. The members of the municipal councils are taken by each assembly of canton from a list of 500 persons of the first consideration of the canton; and these councils shall be renewed, one half, every ten years. The first consul chooses the mayors and assistants in the said councils, who are continued five years in office, but may be rechosen. The assembly of canton nominates for the electoral college of district the number of members assigned to it, in proportion to the number of citizens of which it is composed; and it nominates to the electoral college of department, from a given list, the number of members assigned to it. The government convenes the assemblies of canton, and fixes the time of their duration, and the object of their meeting.

CANTON, or QUANG-CHOO-FOO, a city and maritime port of China, and capital of the province of Quang-tong or Canton. The city and the suburbs are situated for the most part on the eastern bank of the Pe-kiang river, which communicates by canals with the neighbouring provinces. The city is composed, as it were, of three different cities, separated by lofty walls, but so connected, that the same gate serves to pass from the one and to enter into the other. These three cities united form a regular square, and the city wall is said to be about six or seven miles in circumference; though the inclosure is occupied partly by pleasure-grounds and fish-ponds, as well as by private and public buildings. The suburbs are much more extensive. The streets are long and straight, chiefly paved with flat stones, and ornamented at certain intervals with triumphal arches; some of them are covered, and these contain the richest shops. The houses are generally low, consisting only of one story, without windows to the street; but other buildings, inhabited by the most respectable merchants and mandarins, are lofty, spacious, and convenient. Some of these are fitted up in the English manner, with glass windows and fire-grates, the latter of which are found to be useful about the winter solstice. A large garden with ponds and parterres surrounds the buildings. On one side of them is a temple; and on the other, a high edifice, the top of which commands a view of the river and shipping, as well as of the city and the country to a considerable distance. Persons of condition are carried in chairs; and few females are seen in the streets. These, however, are continually crowded, especially with persons, who are all loaded, and most of whom have their heads, legs, and feet bare. There is no other convenience in this city for removing goods from one place to another but by means of porters. The quay on which the European factories are built, and which is very extensive, is situated, without the walls of the city, on the left bank of the river, and displays by flags the colours of every nation. These factories compose a long range of buildings, of one story, with several yards. From behind, they form a street, crowded with shops, which are furnished with every kind of merchandize; and the street is closed at the two extremities by barriers, beyond which the Europeans are not to pass. Formerly they went every where, except into the Tartar town, which is contiguous to the Chinese town. The number of strangers to be seen in the suburbs, while their ships are loading and unloading in the river, together with their various languages, dresses, and characteristic deportment, would give occasion to doubt, if a judgment were to be formed from that part of the town, to what nation it belonged. The town of boats is a league above Canton. They are all in strait rows, and form streets. Each boat, being tolerably large and covered, affords an habitation to a whole family; who have also a small boat to procure provisions.

sions, as well as to go on shore when occasion requires. The number of inhabitants in the town and suburbs of Canton is estimated at a million and a half; and if we consider the great extent of the city, the vast resort of trading vessels and boats, and the immense number of mechanics, tradesmen, merchants, merchants' clerks, porters, watermen, fishermen, husbandmen, and mariners, this estimate will not be thought extravagant. The garrison is sometimes composed of 20,000, at other times of 25,000, and even of 30,000 Tartars. The number of persons, who are obliged to live on the water in boats, and who are prohibited by the express regulation of the law from settling on shore, may amount to 300,000, including the women of the town, who are estimated at 40,000. Canton is not only one of the best and most considerable ports of China, but it is the only one which Europeans are permitted to frequent; it is also the rendezvous of a great proportion of Chinese vessels, trading to Cochinchina, Formosa, Haynan, Siam, Malacca, Achem, Batavia, the Moluccas, Japan, &c. The great objects of import and export are principally carried on in this city by means of agents belonging to companies in Europe. Such have been, as Sir G. Staunton observes, (Embassy to China, vol. ii. p. 527.) the probity, punctuality, and credit of the English East India company in particular, and of their agents, in the estimation of the Chinese merchants, that their goods are always taken, as to quantity and quality, for what they are declared in the invoice; and the sales with their mark pass in trade, without examination, throughout the empire. These agents are divided generally into super-cargoes and writers; and they are allowed a commission on the business which they do, according to their stations in the service. The exports of Canton consist of many articles, but that which is much the most considerable is tea; of which the Europeans and Americans received, in 1795, 5,577,200 lbs., and the English private trade amounted to 23,733,510 lbs. The exports from Canton to India amounted, in 1792, to 330,000l., leaving a vast balance in favour of India, which is paid in cash. The articles purchased for India consist chiefly of raw and wrought silk, sugar and sugar-candy, tutenag, alum, porcelain, camphor, bankeen cloth, quicksilver, and turmeric. In 1792, there were imported into Canton from England, in 16 company's ships, to the amount of near 1,000,000l. in lead, tin, woollens, together with furs, and other articles of private trade. The order for woollens only in the following year was 250,000l. higher than the preceding year. The legal trade from the British dependencies in India to Canton, in 1792, amounted to very near the sum of 700,000l., beside opium, which is clandestinely imported there, to the amount of about 250,000l. The articles legally imported consisted of cotton, tin, pepper, sandal-wood, elephants' teeth, and bees' wax. The total imports from foreign European nations to Canton, in 1792, amounted to 200,000l.; and their exports to upwards of 600,000l. Many of the imports were of British manufacture. The Canton artists are uncommonly expert in the imitation of European works. They repair, and even make watches, copy paintings, and colour drawings, with great success. They supply strangers with coarse silk stockings, knit or woven at Canton, though few or none of them are worn by the natives. The toys made at Canton, and known under the name of balancers and tumblers, are partly filled, and their equilibrium sustained, by quicksilver. The lapidaries of Canton, who cut diamonds, use for that purpose adamantine spar. The amalgama of tin and quicksilver is applied, by the artists in Canton, in making small mirrors, with glass blown upon the spot from broken pieces of that material imported whole from Europe. The spectacles used by the Chinese are formed of crystal, which the Canton

artists cut into laminæ, with a kind of steel saw, formed by twisting two or more fine iron wires together, and tying them like a bow-string to the extremities of a small flexible bamboo. The siliceous powder of the crystal, procured by sawing, is received into a trough of water; and with that mixture the wire and groove formed in the crystal are often moistened. The powder of the crystal, like that of the diamond, helps to cut and polish itself. Gold leaf is used by the silk or velvet weavers in their tissues and embroideries. Trinkets also are made of it at Canton, which, though not worn by the Chinese, are sold in Europe as eastern ornaments. Silver is also drawn into threads, like gold, to be used in the silk and cotton manufactures. For the method used at Canton in preparing their white copper or petung, &c.; see that article.

By the accurate observations of Mr. Raper, during the year 1774, cited by Kirwan in his "Estimate," &c. p. 97, the temperature of Canton was $75^{\circ} 14'$; the standard temperature $75^{\circ} 4'$; the greatest heat in January $66^{\circ} 5'$, the least 51° ; the greatest heat in August 89° , and the least 80° . N. lat. $23^{\circ} 7' 50''$. E. long. $113^{\circ} 2' 15''$.

CANTON, a province of China, of which the above described city is the capital. See QUANG-TONG.

CANTON, a township of America, in Norfolk county, Massachusetts, incorporated in 1797; being formerly the northern part of Stoughton.

CANTON, in *Heraldry*, is one of the nine honourable ordinaries; being a square portion of the escutcheon parted from the rest.

It has not any fixed proportion; though regularly it should be less than a quarter, it is often only a ninth part, and used as an addition, or difference, frequently to express bastardy. The canton is sometimes placed at the right corner, and sometimes at the left; in which latter case, it is called a *canton sinister*. For its form, see *Plate, Heraldry*.

CANTON is also used for the spaces left between the branches of a cross or saltier.

To CANTON, or dispose of in cantonments, in French *cantonner*, in the *Military Art*, is to distribute troops in towns and villages as contiguous to one another and as nearly in the same line as possible, and in such a manner as to command the avenues to the same, and to front the district of country the enemy is in, or the towns, villages, posts, or positions, he may occupy or possess himself of. Troops are sometimes cantoned after the fatigues of a siege, that has been undertaken early in the spring, that they may have some time to repose and recruit themselves; sometimes in the midst of a fatiguing campaign, for the purpose of rest and refreshment; sometimes towards the close of a campaign, when forage is scanty and the weather intemperate, till such time as the enemy shall go into winter quarters; and sometimes before the opening of an early campaign for the sake both of subsistence and of convenience to a proper or eligible camp of exercise, which is at all times within reach of their cantonments, and can be protected from them.

The cantoning of troops is also a phrase occasionally, though not very properly, made use of for the disposing or distributing of troops into winter quarters. See the article QUARTERS.

In a garrisoned town or place, when there is not a sufficiency of barracks and casemats for the troops, different districts of it are allotted to different regiments for the accommodation of their officers and men. And such an allotment or division of the town, is sometimes called the cantoning of it.

CANTONE, in *Commerce*, a measure of three gallons, wine-measure, at Alicante.

CANTONED, a word used in *Architecture*, when the

corner of a building is adorned with a pilaster, an angular column, rustic quoins, or any thing that projects beyond the naked of the wall.

CANTONED, CANTONE', or CANTONIZED, in *Heraldry*, is when the four cantons, or spaces round a cross, or saltier, are filled up with any pieces.—He bears gules, a cross argent, cantoned with four scallop shells.

The word is also used when there are little pieces in the cantons, or spaces, of any principal figure of an escutcheon. Thus the saltier of Lenox is cantoned with four roses.

CANTONING, in *Middle Age Writers*, denotes the dividing a thing into hundreds, or selling it by hundred weights, or hundreds in tale.

CANTONMENTS, in *Military Art*, are a sort of transient or temporary quarters for different purposes, but chiefly for the repose of troops. Cantonments differ from quarters in this respect, that the former are seldom made use of but for a short rest or refreshment to an army that is much fatigued, but continues to do the same sort of duty in them as in the field; whereas in the latter, duty is performed as in garrisoned places.

In quarters of cantonment, the troops ought to be arranged and disposed of nearly in the same manner as in order of battle; viz. with the cavalry on the wings and the infantry in the centre. The cantonments should not be very much scattered or extended. They ought not to exceed ten or twelve leagues in front, or be more than four or five in depth. Before you take the field, they should be a little contracted, and then divided or disposed of under the command of five or six of the oldest generals. One of these should command the cavalry of the right wing, another that of the left, and the rest the infantry in the centre. By such a division or disposition, all orders from the commander in chief will be the more expeditiously executed, and the troops will with greater ease form their columns when they are going to take the field.

CANTOR, in *Entomology*, a species of *CERAMBYX*, found in China. The thorax is unarmed, cinereous, with black dots: wing-cases pale, testaceous; bidentated at the tip, and cinereous with black spots. *Fabricius*.—Obs. This is of the middle size, and villose.

CANTOR, *Lat.* a singer, a chanter. In the Lutheran church, the *cantor* is the coryphæus of the psalmody. In most parts of Germany, where the protestant religion is established, each parish has a cantor to teach singing, and to direct the chorus.

Though cantor is a general appellation for a singer, it is in a particular manner applied, in this country, to the person who has the direction of singing the psalms and hymns in parish churches. He is precentor, or leader of the psalm, which he likewise ends, by singing the last word of every line; so that he may be called the alpha and omega of sacred song.

The cantor, who is likewise frequently schoolmaster, besides having a good voice, should necessarily understand counterpoint; if not in a high degree, at least sufficiently to correct such errors as may have crept into compositions, through the ignorance or carelessness of transcribers. He should likewise be able to make an accurate score, and from the score to figure the base, in such a manner as to include all the accidents of modulation. "Without these qualifications," says M. Walther, in his *Musical Lexicon*, "as a German organist is not gifted with universal knowledge, no perfect harmony can be hoped."

In the market towns and villages of Thuringia, in Saxony, where two persons are usually employed in a school, he who directs the music in the choir, or leads the psalm or chorus,

is called rector or schoolmaster, and the organist is commonly cantor.

CANTRED, or CANTREF, denotes a district or division of an hundred towns or villages. The word is British, compounded of *cant*, hundred, and *trev*, or *tref*, town or village.

Wales, with regard to its lesser divisions, seems to have been originally divided into "bòds," "trevs," and "caers." The "bòd" is supposed to have been the mansion-house of a chieftain on his first settlement in the country; the lands which he assigned for the maintenance of his dependants in the increasing colony were called a "trev;" and the inclosure of such lands for defence or convenience, formed either of wood or stone, might have been denominated a "caer." An assemblage of several "bòds," formed a "trev" or township; and a hundred of these "trevs" constituted a "cantrev." For the more easy and regular dispatch of business, a "cantrev" was divided into two or more "commots;" each of which consisting of a certain number of "bòds" and "trevs" formed a distinct precinct, and was considered as a lordship, possessing a separate court and jurisdiction. Anglesey, in particular, was divided into three "cantrevs" or "cantreds," which are each subdivided into six "commots" or "commotes," each "commote" containing about sixty "trevs" or townships. The general partition of Wales into "cantrevs" and "commots" is very ancient. *Rowl. Monast. Ant. Eff. § x. p. 110, &c.*

CANTU, in *Geography*, a town of Italy, in the Milanese; 5 miles S.S.E. of Como.

CANTUA, in *Botany*, (the Peruvian name) *Lam. Enc. vol. i. p. 603. Illust. 303. Willd. 324. Juss. 136. Vent. vol. ii. 401.* Class and order, *pentandria monogynia*. *Nat. ord. Polemonia*, *Juss. Gen. Ch. Cal. Perianth one-leafed, tubular, rather short, permanent, five, sometimes three-cleft; segments acutely egg-shaped, nearly equal. Cor. monopetalous, funnel-shaped; tube cylindrical, longer than the calyx; border nearly equal, erect, but a little spreading, five-lobed; lobes short, obtuse. Stam. Filaments five, equal, inserted into the tube of the corolla; anthers egg-shaped, small, versatile. Pist. Germ superior, oblong-egg-shaped; Style thread-shaped, about the length of the filaments; stigma triind. Peric. Capsule oblong-egg-shaped, cloathed at its base with the calyx, three-celled, three-valved, opening at the top: valves opposite to the partitions. Seeds numerous, egg-shaped, winged, affixed to a central, triangular receptacle.*

Eff. Ch. Corolla monopetalous, funnel-shaped. Stamens with equal filaments. Capsules three-celled. Seeds winged. Nearly allied to Bignonia.

Sp. i. C. pyrifolia, *Lam. Ill. Pl. 105. fig. 1.* "Flowers terminal; filaments longer than the corolla; leaves egg-shaped, petioled, entire, smooth." *Willd.* A shrub, smooth in all its parts. *Branches* woody, thick, stiff, marked with scattered tubercles or knots. *Leaves* an inch and a half long, and near an inch broad; alternate; petioles short, proceeding from the tubercles. *Flowers* peduncled, in terminal racemes; calyx often three-cleft, and divided more deeply on one side. Found in Peru by Joseph de Jussieu. *2. C. buxifolia*, *Lam. Ill. pl. 106. fig. 2.* "Flowers terminal; filaments shorter than the corolla; leaves oblong, nearly sessile, entire, pubescent beneath." *Willd.* A shrub. *Branches* woody, rather cylindrical, pubescent towards their summit. *Leaves* small, about six lines long, and little more than two broad, alternate or fasciculated, lanceolate-egg-shaped, entire. *Flowers* large, peduncled, upright; peduncles and calyx pubescent; corolla tubular, an inch and half long. Found in Peru by Joseph de Jussieu. *3. C. Hoitzia*, *Willd. (Hoitzia mexicana; Lam. Encyc. Juss.)* "Flowers axillary; filaments longer than the corolla; leaves

egg-

egg-shaped, sessile, toothed." Willd. *Stem* a little shrubby; branches slender, cylindrical, pubescent, especially near their summit. *Leaves* alternate, entire near their base, a little nerved underneath. *Flowers* of a fine red colour, solitary, nearly sessile, on the upper part of the branches; segments of the calyx acute: bractes six, lanceolate, a little longer than the calyx, and surrounding it in the form of an exterior calyx, sharply toothed, and terminated by a spinous point; tube of the corolla four or five times longer than the calyx, slightly curved. *Fruit* not known. A native of Mexico. Willdenow justly observes that as it differs from *Cantua* only in its bractes, it ought not to constitute a distinct genus. 4. *C. pinnatifida*, Lam. Ill. (c. *coronopifolia*, Willd. *Polemonium rubrum*, Linn. Sp. Pl. *Ipomœa rubra*, Syst. veg. Quamoclit pinnatum erectum, Dill. Elth. tab. 241. fig. 312.) "Flowers terminal; stamens the length of the corolla; leaves pinnatifid." *Stem* somewhat shrubby, upright, not milky. Tube of the calyx short; segment of its border awl-shaped, longer than the tube. *Stamens* inserted into the middle of the tube of the corolla without valves. A native of sandy soil in Carolina. Four other species are figured by Ruiz and Pavon in the *Flora Peruvienlis*, and three more by Cavanilles in his *Icones Plantarum*.

CANTWELL, ANDREW, in *Biography*, born at Tipperary in Ireland, but lived principally in Paris, where he was made doctor in medicine in 1742. The same year he published a translation into French of the account of Mrs. Stephens' medicine for dissolving the stone in the bladder; and in 1746 an account of sir Hans Sloane's medicines for diseases of the eyes; also some severe strictures on the practice of propagating the small pox by inoculation; and in the *Philosophical Transactions*, London, N^o 453, an account of a double child, a boy. He died at Paris, July 11, 1764. Haller. Bib. Anat. Eloy Dict. Hist.

CANTY BAY, in *Geography*, sometimes called New bay, lies on the coast of Java in the East Indies, and is formed by an island of the same name. It furnishes the best accommodation for wooding and watering in these seas.

CANTYRE. See KINTYRE.

CANVAS, or CANVASS, in *Commerce*, a coarse sort of linen or hempen cloth, usually woven open, and regularly, in little squares; serving for divers domestic purposes, and especially for the ground of tapestry work and painting.

We have divers sorts and denominations of canvas, most of them imported from abroad; as Dutch, Barras, and Hessian canvas; packing canvas; guttings and spruce canvas; poledavies, ebbing, or Queensbrough canvas; working canvas, for botts or cushions, narrow, broad, and broadest.

CANVAS also is the cloth on which painters usually draw their pictures; the canvas being smoothed over with a slick-stone, then sized, and afterwards whited over, makes what the painters call their *primed cloth*, on which they draw their first sketches with a coal or chalk, and afterwards finish with colours.

CANVAS is also a name sometimes given to sail cloth.

CANVAS-bags, in the *Military Art*, contain about a cubic foot of earth or sand, with which they are filled. Their use is to raise a parapet in haste, or to repair one when beaten down. See SACKS of earth.

CANVAS is also used among the French, for the model or first words, whereon an air, or piece of music, is composed, and given to a poet to regulate and finish. The canvas of a song contains certain notes of the composer, which shew the poet the measure of the verses he is to make. Thus Du Lot says, he has canvas for ten sonnets against the Muses.

CANUCCIS, in *Ancient Geography*, the station of a Roman colony in Africa, planted there by Augustus, about 7 miles W. from Jol; the Gunugi of Ptolemy, and Gunagus of the Itinerary, and corresponding to the Bressk of the Algerines. See BRESK.

CANVEY, in *Geography*, a small island in the mouth of the Thames, near the coast of Essex, about 5 miles long and 2 wide; high tides often overflow the lowest parts of it: 5 miles N.W. from the Nore.

CANULA. See CANNULA.

CANUS, in *Zoology*, a South American species of COLUBER, distinguished by having 188 abdominal plates, and 70 caudal scales. Linn. Mus. ad. Fr.

This snake is described by Boddaert as being of a hoary colour, with large whitish spots disposed ferrately, with a snowy white spot between each. The snout is obtuse and rounded; head imbricated with scales. It is conceived that this species ought to be considered as a connecting link between the two genera Boa and Coluber.

CANUSIUM. See CANOSA.

CANUTE, surnamed "the Great," in *Biography*, king of Denmark and England, succeeded his father Sweyn in the first kingdom, about the year 1014; and commenced his reign with the invasion of England and Norway, both which kingdoms had revolted from his father. England, however, was his principal object; and as the English had recalled Ethelred their king, who had abdicated the throne, he was not unapprehensive that this event might lead to an attempt for rendering him independent of the crown of Denmark. Accordingly he prepared for an invasion of the kingdom, and soon appeared with a fleet off the eastern coast, which he ravaged with merciless fury; putting ashore all the English hostages at Sandwich, after having cut off their hands and noses. His absence, however, had afforded Olaus king of Norway an opportunity of invading his kingdom, and he was under a necessity of returning home in order to check his progress. This enterprise having been completely accomplished, he resumed his attack on England, and made great depredations on the southern coast, where an army was assembled against him, under the command of prince Edmund and duke Edric, the son-in-law of Ethelred, who was a notorious traitor. Edric still continued his perfidious machinations; and after endeavouring in vain to get the prince into his power, he found means to disperse the army; and he then openly deserted to Canute with 40 vessels. When prince Edmund, called "Ironside," succeeded his father Ethelred, he contended gallantly against Canute and his confederates; but after the loss of two battles, occasioned chiefly by the falsehood and treachery of Edric, he was obliged to acquiesce in a treaty, which divided the kingdom between him and Canute. The latter reserved to himself the northern division, consisting of Mercia, East Anglia, and Northumberland, which he had entirely subdued; and the southern parts were reserved for Edmund. This prince survived the treaty about a month; and his murder, by the accomplices of Edric, made way for the succession of Canute to the crown of England, A.D. 1017. Against his valour and activity and the strong force which he commanded, the two sons of Edmund could make but an ineffectual resistance; however, Canute, before he seized the dominions of the young princes, summoned a general assembly of the states in order to secure to himself the succession of the kingdom. In order to maintain the unmoisted possession of the throne, he gratified some of the nobility with extensive governments and jurisdiction, and others, on whose fidelity he could not rely, he put to death. Among the latter was the perfidious Edric. His Danish followers were liberally recompensed by means of the heavy taxes which

were laid on the people, and particularly on the inhabitants of London, who were thus retaliated for their affection to Edmund and their resistance to the Danish power in two obstinate sieges. In one of these sieges he diverted the course of the Thames, and thus by a new channel brought his ships above London-bridge. Canute, having by the concurrence of art and power established himself upon the throne, determined, with the soundest policy, to reconcile his English subjects to the Danish yoke, by the justice and impartiality of his administration. Accordingly, he sent back to Denmark as many of his followers as he could spare; he restored the Saxon customs in a general assembly of the states; he made no distinction between the Danes and English in the distribution of justice; and he took care by a strict execution of law, to protect the lives and property of all his people. In process of time the Danes were gradually incorporated with his new subjects. For the greater security of his government he contrived to remove the two sons of Edmund to Hungary; and, to conciliate the Normans, who espoused the cause of Alfred and Edward, the sons of Ethelred, he married Emma, the mother of these princes and the sister of Richard, Duke of Normandy.

Canute, having settled his power in England beyond the danger of a revolution, made a voyage to Denmark, for the purpose of resisting the attacks of Osmund, king of Sweden; and in this expedition he was accompanied by a great body of the English, under the command of the earl Godwin. The earl, by his skill and valour, contributed to the total discomfiture of the Swedish army, and so effectually recommended himself to Canute, as not only to obtain his daughter in marriage, but to lay the foundation of that immense fortune which afterwards accrued to his family. Canute, availing himself of this advantage, passed with such celerity to Schonen, that he surprised, defeated, and slew in battle the king of Sweden. In another voyage, which he made afterwards to Denmark, he attacked Norway, and expelling the just, but unwarlike Olaus, kept possession of his kingdom till the death of that prince. Canute was now one of the most powerful sovereigns in Europe; extending his empire over Denmark, Norway, and England, and having rendered Sweden tributary. But neither the elevation of his rank, nor the extent of his dominion, could bound the grasp of his capacious and aspiring mind. Experience taught him the unsatisfactory nature of all terrestrial enjoyments; and he began to direct his views towards that future existence, which it is so natural for the human mind, whether fatiated by prosperity or disgusted with adversity, to make the object of its attention. The spirit of the age in which he lived, however, gave a wrong direction to his devotion; and instead of making compensation to those whom he had injured by his former acts of violence, he employed himself entirely in those exercises of piety, which the monks represented as the most meritorious. He built churches, endowed monasteries, enriched ecclesiastics, and bestowed revenues for the support of chantries, in various places, where he appointed prayers to be said for the souls of those who had there fallen in battle against him. He even undertook a pilgrimage to Rome, where he resided a considerable time, and where he obtained from the pope some privileges for the English schools erected in that capital, and exemptions from those impositions and tolls which the English pilgrims had been accustomed to pay in the countries through which they passed. It is natural to imagine that a sovereign, so prosperous and powerful, should meet with adulation from his courtiers. A singular, but well known, instance of this kind occurs in the case of Canute. Some of his flatterers, when they were one day expressing their admiration of his

grandeur and dominion, said to him, that nothing was beyond the reach of his power: upon which the monarch, it is said, ordered his chair to be set on the sea-shore, while the tide was rising; and as the waters approached, he commanded them to retire, and to obey the voice of him who was lord of the ocean. He feigned to sit some time in expectation of their submission; but when the sea still advanced towards him, and began to wash him with its billows, he turned to his courtiers, and remarked to them, that every creature in the universe was feeble and impotent, and that power resided with one Being alone, in whose hands were all the elements of nature; who could say to the ocean, "Thus far shalt thou go, and no farther;" and who could level with his nod the most towering piles of human pride and ambition. The only memorable action which Canute performed, after his return from Rome, in 1031, was an expedition against Malcolm, king of Scotland, who had refused to render him homage for the county of Cumberland, which he held as vassal to the crown of England. Upon his appearing on the frontiers with a formidable army, Malcolm submitted, and agreed, that his grandson and heir, Duncan, whom he put in possession of Cumberland, should make the submissions required, and that the heirs of Scotland should always acknowledge themselves vassals to England for that province. After this enterprise Canute passed four years in peace, and died at Shaftesbury, in 1035; leaving three sons, Sweyn, Harold, and Hardicanute, and appointing, by his will, Harold successor to the English crown. *Mod. Un. Hist.* vol. xxviii. p. 429. *Hume's Hist. of England*, vol. i. p. 145—154.

CANUTI AVIS, in *Ornithology*, *tringa canutus*; our common knot is so called by some old writers.

CANUTUS, in *Ornithology*, a species of *TRINGA*, known in this country by the name of *knot*. It is a native of various parts of Europe, and of America. The bill is smooth; legs inclining to ash colour; primary quill feathers serrated; outermost tail-feathers white, and without spots. *Fn. Suec. Brünnich*, &c.

The bill of this bird is dusky ash-colour; irides hazel; lores dusky; eye-brows and band on the wings white; body cinereous above, beneath white; lower wing-coverts tipped with white; chin and breast with minute spots; belly and vent with dusky lines.

CANUTUS, a species of *TRINGA*, with smooth bill; legs inclining to ash-colour; primary quill feathers serrated, exterior tail feathers white and without spots. *Fn. Suec. Obs.* This is the knot of English writers, Canutus of Briffon, and Canut of Buffon. Inhabits Europe and America. Length nine inches; flesh excellent.

CANY, in *Geography*, a town of France, in the department of the Lower Seine, and chief place of a canton in the district of Yvetot; the place contains 1432, and the canton 12,157 inhabitants; the territory includes 127½ kilometres, and 23 communes. The adjacent country produces great quantities of corn and flax. N. lat. 49° 48'. E. long. 0° 32'.

CANY Fork, a river of America, in the state of Tennessee, which is short and navigable, and runs N. W. into Cumberland river, W. of the Salt-lick and opposite Salt-lick creek, 50 miles in a straight line from Nashville.

CANYTIS, in *Ancient Geography*. See CATYTIS.

CANZONE, an Italian lyric poem in regular stanzas, for which Dante has given precepts and established the laws. The *canzoni* of Petrarca, and the old poets seem to want variety of measure, and to be too long ever to have been intended for music.

CANZONETTA, is the diminutive of *canzone*, a short lyric poem, and always intended for music.

CANZURI, a name given by some authors to a peculiar kind of camphor more esteemed than any other sort. Some have supposed it thus called from *Kanzur* or *Chanzur*, the name of a place where they suppose it to be produced, which seems the more probable opinion, though Scaliger rejects it. See CANDERROS.

CAO-CHAN, in *Geography*, a town of Asia, in the kingdom of Corea; 30 miles E.S.E. of Hethin.

CAO-CHAN-LI, a town of Asia in Corea; 420 miles E. of Peking.

CAOINAN, the name given to the funeral song of the Irish. Mr. Beauford (*Irish Transf.* Vol. IV. p. 46, &c.) has presented to the curious a specimen of this song, with the words in Irish and English, set to musical notes, with its full choruses of sighs and groans, and burden of ulla lulla lulla la. He has also prefixed a brief account of the modes of lamentation, by howls, gestures, and ceremonies, which have prevailed, and which still, in a degree, prevail in Ireland. He supposes them to have been derived from the primæval inhabitants of Ireland, of Celtic race. These, he says, were a timorous and unwarlike race, as their military weapons, and every vestige of their customs and manners strongly indicate: their religion also was spiritual and untainted with human blood. Such a religion and such manners imply a susceptibility of tender impressions, and feminine expressions of sorrow. Accordingly, it has been affirmed of the Irish, that to cry was more natural to them than to any other nation, and at length the Irish cry became proverbial. Cambrensis, in the 12th century, informs us, that the Irish then musically expressed their grief, or applied the musical art, in which they are said to have excelled all others, to the orderly celebration of funeral obsequies, by dividing the mourners into two bodies, each alternately singing their part, and the whole, at times, joining in full chorus. This antiphonal singing is said to have been coeval with Christianity in this isle. See ANTIPHONY. It was then the funeral elegy rose in poetic numbers, and was sung in poetic accents to the sound of musical instruments. After the body of the deceased, dressed in grave cloths, and ornamented with flowers, was placed on a bier, or some elevated spot, the relatives and "Keeners" ranged themselves in two divisions, one at the head and the other at the feet of the corpse. The funeral caoinan having been previously prepared by the bards and "croteries," the chief bard of the head chorus began, by singing the first stanza in a low doleful tone, which was softly accompanied by the harp: at the conclusion, the foot semi-chorus began the lamentation of "ullaloo," from the final note of the preceding stanza, in which they were answered by the head semi-chorus; these both united in one general chorus. The chorus of the first stanza being ended, the chief bard of the foot semi-chorus sung the second stanza, the strain of which was taken from the concluding note of the preceding chorus; which ended, the head semi-chorus began the second "gol" or lamentation, in which they were answered by that of the foot, and then, as before, they united in the general full chorus. These alternately were the song and choruses performed during the night: the genealogy, rank, possessions, virtues, and vices of the dead were rehearsed; and various interrogations were addressed to the deceased. Each versicle of the Caoinan, it is said, consisted only of four feet, and each foot was commonly of two syllables; the three first required no correspondence, but the fourth was to correspond with the terminations of the other versicles. This kind of artificial metre was much cultivated by the Irish bards; but, on the decline of that order, the caoinan was assumed by women, and became an extemporaneous

performance. Each province was supposed to have different caoinans, and hence the Munster cry, the Ulster cry, &c. which are only different imitations of the different chorusses of the same caoinan, independent of provincial distinctions. As the caoinan was sung extempore, and had no genuine established time, each set of "Keeners" varied the melody according to their taste and musical abilities, carefully preserving, however, the subject or burden of the song throughout, both in the vocal and instrumental part, as begun by the leading "Keener." The caoinan is at present much neglected; and this ancient custom will probably soon cease; English manners and the English language supplanting that of the aboriginal natives. At the conclusion of the "Keenan," the body was conveyed to the place of interment, attended by the friends and relatives of the deceased, and accompanied by the cries of women, who at certain intervals sung the "gol" or "ullaloo." In ancient times, after the interment, the favourite bards of the family, seated on the grave or sepulchre, performed the "conn-thal" or elegy; which they repeated every new and full moon, for the first three months, and afterwards generally once every year, for persons of distinction. The elegy was more regular than the "keenan," both in respect to its poetical composition and concluding cadence. The families, both in Wales and Ireland, retained this custom to the close of the last century, and it is frequently alluded to in the Irish ballads and poetical romances.

CAO-LIM, in *Geography*, a town of Asia in Corea; 600 miles E.N.E. of Peking. N. lat. $42^{\circ} 40'$. E. long. $129^{\circ} 29'$.—Also, a town of Chinese Tartary. N. lat. 42° . E. long. $123^{\circ} 54'$.

CAO-MING, a town of China, of the second rank, in the province of Yunan. N. lat. $25^{\circ} 22'$. E. long. $102^{\circ} 44'$.

CAO-TANG, a town of China, of the second rank, in the province of Chantong; 200 miles S. of Peking. N. lat. $36^{\circ} 58'$. E. long. $115^{\circ} 54'$.

CAO-TCHIN, a town of China, of the third rank, in the province of Pet-cheli; 15 miles E.S.E. from Tchingting.

CAO-Y, a town of China, of the third rank, in the province of Pet-cheli; 30 miles S. of Tching.

CAO-YAM, a town of China, of the third rank, in the province of Pet-cheli; 12 miles S. of Gan.

CAO-YANG, a town of Asia, in the kingdom of Corea; 7 miles N.W. of King-kitafo.

CAO-YUEN, a town of China, of the third rank, in the province of Chang-tong; 42 miles N.W. of Tchintcheou.

CAORLO, a town of Italy, on an island of the same name, in the gulf of Venice, near the coast of Friuli; the see of a bishop, suffragan of Venice. N. lat. $45^{\circ} 54'$. E. long. $12^{\circ} 44'$.

CAOUANNA, in *Zoology*, *Caouanne* of Ray; *testudo caretta* of modern naturalists, and logger-head turtle of Catesby. The flesh of this species is highly rancid, harsh, tough, and stringy. See TESTUDO CARETTA.

CAOUKE, in the *Turkish Dress*, a high stiff turban, worn by the odabashees, or heads of the chambers of janizaries, when they go in procession.

CAOUTCHOUC, *Elastic Gum*, in *Chemistry*. This singular vegetable substance was first brought to Europe from South America, about the beginning of the last century. Nothing however was known concerning its natural history till a memoir was presented in 1736 to the French academy by Condamine, in which it is stated, that there grows in the province of Esmeraldas in Brasil, a tree called by the natives "Hhevé," from

from the bark of which, when wounded, there flows a milky juice, which by exposure to the air, is converted into caoutchouc. Some time after, the same tree was found in Cayenne by M. Freneau; and it appears from later researches, that this singularly elastic substance is procured from at least two trees natives of South America: of these, the one is called by botanists *hævea caoutchouc*, and the other, *jatropha elastica*. The American caoutchouc is usually brought to Europe in the form of globular narrow necked bottles, about a fourth of an inch thick, and capable of holding from half a pint to a quart or more. They are formed upon moulds of unburnt clay, pieces of which are often found adhering to the inside. In its native country it is fabricated by the inhabitants into vessels for containing water and other liquids, and on account of its inflammability, it is used at Cayenne for torches.

In the Asiatic researches is an account by Mr. Howison, surgeon at Pulo Penang, of a substance exhibiting all the properties of caoutchouc, procured from the juice of a climbing plant, the *urceola elastica*, a native of that small island, and the neighbouring coast of Sumatra. If one of the thicker and older stems of this plant is cut into, a white juice oozes out, of the consistence of cream, and slightly pungent to the taste. By exposure for a short time to the action of the air, or still more expeditiously by the addition of a few drops of acid, a decomposition takes place; the homogeneous thick cream-like juice, separates into a thin whitish liquor, resembling whey, and the caoutchouc concretes into a clot or curd, covered superficially with a thin coating of a butyraceous substance. If the juice as soon as secreted is carefully excluded from the air, it may be preserved for some weeks without any material change, but at length the caoutchouc separates from the watery part in the same manner, though not so perfectly as it does by free exposure to the air. The proportion of caoutchouc contained in the juice by the oldest stems, is nearly equal to two thirds of its weight; the juice from the younger trees is much more fluid, and contains a considerably smaller proportion of this substance.

According to the experiments of Mr. Howison, cloth of all kinds may be made impenetrable to water by impregnating it with the fresh juice of the *urceola*; and the pieces thus prepared are most effectually and expeditiously joined together by moistening the edges with the entire juice, or even the more watery part, and then bringing them in contact with each other. Boots, gloves, &c. made of this impervious cloth are preferable even to those formed of pure caoutchouc, as they are more durable and retain their shape better. If a sufficient quantity of this juice could be obtained, it might no doubt be applied to a vast variety of important purposes.

The colour of fresh caoutchouc is yellowish white, but by exposure to the air it becomes of a smoky grey. American caoutchouc, in the state in which it is brought to Europe, being formed of a multitude of extremely thin layers, each of which is exposed to the air for some time in order to dry before the next is laid on, is of a yellowish smoky-grey colour throughout, but masses of East Indian caoutchouc being formed more expeditiously, are dark-coloured only on the outside; when cut into, they are of a very light brown, which however soon deepens by the action of the air. Caoutchouc is perfectly tasteless, and has little or no smell, except when it is warmed; it then gives out a faint peculiar odour. The elasticity of this substance is very remarkable, and indeed is one of its most characteristic properties. Slips of caoutchouc when softened by immersion for a few minutes in boiling water, may be drawn out to seven or eight

times their original length, and will afterwards resume very nearly their former dimensions. During its extension, a very sensible warmth is produced, as may be perceived if the piece is held between the lips; and on the contrary, when it is allowed to contract, a decrease of temperature will immediately take place. By successive extensions and contractions, especially in cold water, its elasticity is much impaired; but if in this state it is immersed for a time in hot water, it reabsorbs the caloric which it had lost, returns to its original size, and recovers its primitive elasticity. At the temperature of about 40° Fahr. caoutchouc begins to grow rigid, its colour becomes much lighter, and it is nearly opaque, and as the cold increases, it becomes still more stiff and harder. These changes, however, depend merely on temperature, for a piece of hard frozen caoutchouc again resumes its elasticity on being warmed. The fresh cut surfaces of this substance will unite together by simple contact, and by a proper degree of pressure, may be brought so completely in union as to be no more liable to separate in this part than in any other. Its sp. gr. according to Brissou is 0.933. It undergoes no alteration by the action of the air at the common temperature. When boiled for a long time in water it communicates to this fluid a peculiar smell and flavour, and is so far softened by it, that two pieces thus treated, and afterwards strongly pressed, will form a permanent adhesion to each other.

When heated to a temperature nearly equal to that of melting lead, caoutchouc runs into a black viscid fluid of the consistence of tar, which does not concrete on cooling, neither does it dry by long exposure to the air. When held to a candle it readily takes fire, and burns with a copious white flame, and a large quantity of dark coloured smoke, exhaling at the same time a peculiar, but not unpleasant odour: from its smoke a considerable quantity of very fine lamp black may be collected. In dry distillation it gives out ammonia and carbonated hydrogen.

Concentrated sulphuric acid, when heated, acts with great energy on caoutchouc, reducing it to a black friable carbonaceous substance, the acid at the same time being in part decomposed, and sulphureous acid being produced. When treated with nitric acid, azotic gas and carbonic and prussic acid are disengaged, oxalic acid is left in solution, and the residue is converted into a yellow friable mass. By digestion in oxymuriatic acid the colour of caoutchouc is discharged, it becomes opaque, indurated, and wrinkled, like tanned leather, but appears to undergo no other change. Similar effects are produced, though more slowly, by muriatic acid.

Ammoniacal gas, according to Dr. Thomson, is absorbed by caoutchouc, and converts it into a soft, glutinous, and inelastic substance. The same able chemist also states, that the caustic fixed alkalies are capable of combining with, and dissolving it. Caoutchouc is also soluble with ease at a boiling heat in the expressed vegetable oils, in wax, butter, and animal oil, forming viscid inelastic compounds. Alcohol appears not to have the smallest action on it either cold or hot.

Rectified oil of turpentine, at the common temperature, acts without difficulty on caoutchouc, first rendering it transparent, and enlarging its bulk considerably, and in the course of a few days, effecting a complete solution. This compound is of the consistence of drying oil, and when spread thin on wood, it forms a varnish which however is a long time in becoming quite dry. When mixed with a solution of wax in boiled linseed oil, it composes an elastic varnish which is used for covering balloons.

The only menstrua for this substance, from which it can

can be separated again unaltered, are ether, naphtha, and cajeput oil.

The solubility of caoutchouc in ether was first discovered by Macquer, a circumstance which from its frequent failure in the hands of other chemists, was very generally called in question, till Cavallo cleared up the difficulty by showing the necessity of employing washed ether for this purpose. If rectified sulphuric ether is shaken in a vial with some pure water, it dissolves about a tenth of its weight of this latter substance, and in this state is capable of effecting a complete and speedy solution of caoutchouc. The solution is of a light brown colour, and when saturated, is considerably viscid. A drop of it let fall into a cup of water immediately extends itself over the whole surface; and the ether being partly absorbed by the water, and partly evaporated, the water is found covered with an extremely thin film of caoutchouc, possessing its elasticity, and all its other characteristic properties. A similar effect takes place when cloth of any kind is soaked in the solution, or any hard surface is smeared over with it; on exposure to the air the ether is rapidly evaporated, and the caoutchouc which it was combined with is left behind. The affinity of this solution for caoutchouc is very great: if the edges of two pieces of caoutchouc are dipped in it and immediately brought in close contact with each other, as soon as the ether is evaporated, they will be found to be perfectly united.

There are two circumstances which must always prevent the extensive use of the ethereal solution of caoutchouc, admirably qualified as it is in other respects for many useful purposes; these are, first, its expensiveness, and secondly, the extraordinary rapidity with which the ether evaporates; thus rendering it impossible to lay an even coating of this varnish on any surface, and clogging up the brushes by which it is applied. In order to form tubes or catheters of this substance, the best method is to cut a bottle of caoutchouc in a long single slip, and soak it for half an hour or an hour in ether: by this means it will become soft and tenacious, and if wound dexterously on a greased mould, bringing the edges in contact with each other at every turn, and giving the whole a moderate and equal pressure by binding it with a tape wound in the same direction as the caoutchouc, a very effectual union will be produced; after a day or two, the tape may be taken off and the cylinder of caoutchouc may be rendered still more perfect by pouring a little of the ethereal solution into a glass tube closed at one end, the diameter of which is a little larger than that of the cylinder of caoutchouc; which being introduced into the tube, will force the solution to the top of the vessel. Let the whole of the apparatus be then placed in boiling water; the ether will be evaporated, and a smooth and uniform coating of newly deposited caoutchouc will remain upon the cylinder.

Petroleum when rectified by gentle distillation, affords a colourless liquid not to be distinguished from the purest naphtha, and this, according to Fabbroni, has the property of dissolving one seventieth of its weight of caoutchouc, and of depositing it again unaltered by spontaneous evaporation. It does not appear, however, that this menstruum has been much employed.

The solubility of caoutchouc in cajeput oil was first noticed by Dr. Roxburgh. This is an essential oil procured in India, by distillation, from the leaves of the *Melaleuca Leucadendron*. The solution is very thick and glutinous; and is decomposable by alcohol, this latter uniting with the essential oil and leaving the caoutchouc floating on the liquor in a soft semifluid state. This on being washed with alcohol, and exposed to the air, becomes as firm and elastic as before it was dissolved; while in the intermediate state between

fluid and firm, it may be drawn out into long transparent threads, resembling in the polish of their surface, the fibres of the tendons of animals, and so extremely elastic, that when broken, each end immediately returns to its respective mass. Through all these stages the least pressure with the finger and thumb is capable of uniting different portions as completely as if they had never been separated, and that without any clamminess or sticking to the fingers.

The uses to which caoutchouc has been hitherto applied, are the following. It is chiefly used for rubbing out black-lead-pencil marks from paper, whence its vulgar name Indian rubber: it is of value to the chemist as a material for flexible tubes to gazometers and other apparatus; the surgeon is indebted to it for flexible syringes and catheters; and finally it enters as an essential ingredient into the composition of the best varnish for balloons.

CAOUTCHOUC Vine, in *Botany*, a species of *Urceola*, which see.

CAP, a garment serving to cover the head, and made nearly of its figure.

The æra of caps and hats is referred to the year 1449, the first seen in these parts of the world being at the entry of Charles VII. into Rouen; from that time they began, by little and little, to take place of the hoods or chaperons, that had been used till that period. M. le Genère, indeed, goes farther back; they began, says he, under Charles V. to let fall the angles of the hood upon the shoulders, and to cover the head with a cap, or bonnet: when this cap was of velvet, they called it *mortier*: when of wool, simply *bonnet*: the first was laced, the latter had no ornament, besides two horns, raised to a moderate height, one of which served in covering and uncovering. None but kings, princes, and knights, were allowed the use of the *mortier*.

The cap was the head-dress of the clergy and graduates. Pasquier says, that it was anciently a part of the hood worn by the people of the robe; the skirts whereof being cut off, as an incumbrance, left the round cap an easy commodious cover for the head; which round cap being afterwards assumed by the people, those of the gown changed it for a square one, first invented by a Frenchman, called Patrouillet: he adds, that the giving of the cap to the students in the universities, was to denote, that they had acquired full liberty, and were no longer subject to the rod of their superiors; in imitation of the ancient Romans, who gave a *pileus*, or cap, to their slaves, in the ceremony of making them free: whence the proverb, *Vocare servos ad pileum*. Hence also on medals, the cap is the symbol of liberty, whom they represent holding a cap in her right hand, by the point. When this cap was exposed to the view of the people, on the top of a spear, as in the case of the conspiracy which had occasioned the death of Cæsar, it was intended as a public invitation to the people, to embrace the liberty that was offered to them by the destruction of their tyrant. This thought of the conspirators on occasion of this event, was not new; for Saturninus, in his sedition, when he had possessed himself of the Capitol, exalted a cap on the top of a spear, as a token of liberty to all the slaves, who would join with him; and though Marius, in his sixth consulship, destroyed him for that act, by a decree of the senate, yet he himself used the same expedient afterwards to invite the slaves to take arms with him against Sylla, who was marching with his army into the city to attack him. Val. Max. viii. 6.

The Romans were many ages without any regular covering for the head: when either the rain or sun was troublesome, the lappet of the gown was thrown over the head; and hence it is that all the ancient statues appear bareheaded, excepting sometimes a wreath, or the like. And the same

usage obtained among the Greeks, where, at least during the heroic age, no caps were known. The sorts of caps or covers of the head in use among the Romans on divers occasions, where the *pitra*, *pileus*, *cucullus*, *galerus*, and *palliolum*, the differences between which are often confounded by ancient as well as modern writers.

The French clergy wear a shallow kind of cap, called *CALOTTE*, which only covers the top of the head, made of leather, fatten, worsted, or other stuff. The red cap is a mark of dignity allowed only to those who are raised to the cardinalate. The secular clergy are distinguished by black leathern caps, the regulars by knit and worsted ones.

The Chinese have not the use of the hat, like us; but wear a cap of a peculiar structure, which the laws of civility will not allow them to put off: it is different for the different seasons of the year; that used in summer, is in form of a cone, ending at top in a point. It is made of a very beautiful kind of mat, much valued in that country, and lined with fatten: to this is added, at top, a large lock of red silk, which falls all round as low as the bottom; so that, in walking, the silk fluctuating regularly on all sides, makes a graceful appearance: sometimes, instead of silk, they use a kind of bright red hair, the lustre whereof no weather effaces. In winter they wear a plush cap, bordered with martlet's, or fox's skin; as to the rest, like those for the summer. Nothing can be neater than these caps; they are frequently sold for eight or ten crowns; but they are so short that the ears are exposed.

The cap or bonnet is a mark or ornament of certain characters: thus churchmen, and the members of universities, students in law, physic, &c. as well as graduates, wear "square caps." In most universities, doctors are distinguished by peculiar caps, given them in assuming the doctorate. Wickliffe calls the canons of his time *bifurcati*, from their caps. Pasquier observes, that in his time, the caps worn by the churchmen, &c. were called "square caps," though, in effect, they were round yellow caps.

The cap is sometimes also used as a mark of infamy: in Italy the Jews are distinguished by a yellow cap; at Lucca by an orange one. In France, those who had been bankrupts were obliged ever after to wear a green cap, to prevent people from being imposed on in any future commerce. By several arrests in 1584, 1622, 1628, 1688, it was decreed, that if they were at any time found without their green cap, their protection should be null, and their creditors empowered to cast them into prison: but the practice is not now continued.

CAP of maintenance, or *Cap of state*, one of the regalia or ornaments of state belonging to the kings of England, before whom it was carried at the coronation and other great solemnities; and also of the mayors of several cities in England. It is of crimson velvet faced up ermine, with two points turned to the back; and was formerly esteemed a badge and symbol of dignity, and suitable to a prince of the blood, being worn by king Edward III. and succeeding kings of England down to Edward VI.; but of late it hath been granted to private families. It is frequently to be met with above the helmet, instead of a wreath, under gentlemen's crests.

CAP of a gun, is a piece of lead which is put over the touch-hole of a gun, to keep the priming from being wasted or spilt.

CAP, in a *ship*, is a square piece of timber, put over the head, or upper end of a mast, having a round hole to receive the mast. By these caps, the top-masts, and top-gallant-masts, are kept steady and firm in the tressel-trees, where their feet stand; as those of the lower-masts do in their steps.

Or, a cap is a thick block of elm-timber, with two holes perpendicularly to its length and breadth, and parallel to its thickness, (the foremost hole being round, and the after one square), used to confine two masts together, when one is erected at the head of the other to lengthen it. The main and foremast caps of large ships are of elm, and made of two pieces coaked or douled together in the middle; and others are of one solid piece. The main cap, in length, is to be four times the diameter of the top-mast, with the addition of three inches; the breadth is to be twice the diameter, with the addition of two inches; and the depth four-ninths of the breadth. The fore-cap, in length, is to be four times the diameter of its top-mast, with the addition of two inches; the breadth twice the diameter, with the addition of one inch; and the depth four-ninths of the breadth. The length of the mizen cap is to be four times the diameter of its top-mast, with the addition of one inch; the breadth, twice the diameter; and the depth four-ninths of the breadth. The caps of yachts and similar vessels have a sheave-hole on each side for the jeers of the lower yards. If the cap is made of two pieces, the thickness of the coak is added to one piece. When the coak is adjusted, the two pieces are bolted through with six bolts, one inch diameter, two at each end, and two in the middle, which are driven from each side alternately and clenched on a ring. The holes are set off from the centre of the under-side of the cap at equal distances, and the distance between the holes is to be two-fifths of the diameter of the round hole, and half the tapering of the mast head in its length. The round holes of all caps are leathered and nailed on the upper and lower sides. In order to allow for the shrinking of the caps, the size of the tenon is taken $1\frac{1}{2}$ inch above the stops, and that is set off on the under side of the cap; the caps are also to be raised above a level from the middle-line on the mast $\frac{1}{4}$ of an inch to a foot in length, in order to allow for their drooping. See *MAST*, and *PLATE of SHIPS*.

CAP, is also a semicircular projection from the sides and round the end of a block, above the pin; through which two holes are bored, obliquely from the sides, meeting and forming an angle at the end; through these holes the strap is passed, to prevent its being chafed. See *BLOCK*.

To CAP, is said of a ship in the trials of the running or setting of currents.

To CAP a rope, is to cover the end with tarred canvas, which is whipt with twine or spun yarn.

CAP, in *Chemistry*, signifies the piece which terminates the top of a melting FURNACE.

CAP, in *Geography*. See *BUTTON island*.

CAP, in *Phytology*, a name given to the husk or green succulent coat which covers the upper part of a nut, and connects it with the parent tree. The cap consists of a pilling and parenchyma derived from the bark, and ramulets from the ligneous body of the branch.

CAP of a MUSHROOM, is the head or superior part expanded over the foot stalk, somewhat in manner of a canopy, or umbrella.

CAP, or *great CAP*, in *Surgery*, a denomination of a kind of compendious bandage, serving for almost all occasions of the head, being in figure not unlike a helmet. Among chirurgical instruments we met with a silver *cap*, *pileolus argenteus*, (though of late also made of wood, or even white wax), perforated at both ends, applied to the paps of nursing women, when ulcerated, for the more commodious giving of suck.

CAP, black, in *Ornithology*, the pewit, *TRINGA VANELLUS*.

CAP, black, also the *MOTACILLA ATRICAPILLA*.

CAP, Neptune's. See *NEPTUNE*.

CAP, priest's, in *Fortification*. See BONNET à *prêtre*.

CAP-merchant, in a trading ship, is the same officer who is called purser on board a man of war. The French call him writer (*ecrivain*). He is appointed by the merchant to whom the ship belongs, to take care that nothing be embezzled or squandered away.

CAPACINI, in *Geography*, a town of Naples, in the province of Capitanata; four miles west of Vietta.

CAPACIO, a town of Naples, in the province of Principato Citra, the see of a bishop, suffragan of Salerno; five miles north of Agropoli.

CAPACITY, in a general sense, an aptitude or disposition to retain or hold any thing.

CAPACITY, in *Geometry*, denotes the solid content of any body; and "measures of capacity" are our hollow measures for wine, beer, corn, salt, &c.

CAPACITY, in *Law*, signifies the ability possessed by an individual, or body politic, to give or take lands, or other things, or to sue actions. Our law allows the king two capacities, a natural and a political: in the first he may purchase land to him and his heirs; in the latter, to him and his successors. An alien born hath sufficient capacity to sue in any personal action, and is capable of personal estate; but he is not capable of lands of inheritance. See ALIEN. Persons attainted of treason or felony, ideots, lunatics, infants, &c. are not capable of making any deed of gift, grant, or conveyance, unless in some special cases. Co. Litt. 171, 172. See INFANT, IDEOT, &c. All persons are capable of committing crimes and suffering punishment, on behalf of whom the want or defect of will cannot be legally pleaded. There are three cases in which the will does not join with the act, viz. where there is a defect of understanding; where there are understanding and will sufficient, but not called forth and exerted by the party possessing them at the time of the action done, as in the case of all offences committed by chance or ignorance; and where the action is constrained by some outward force or violence. Beside the cases comprehended under these particulars, there is one more in which the law supposes an incapacity of doing wrong, from the excellence and perfection of the person: this is the case of the king, who, by virtue of his royal prerogative, is not under the coercive power of the law; which will not suppose him capable of committing a folly, much less a crime. Blackst. Com. b. iv. c. 2.

CAPACITY, in the *Modern Doctrine of Heat*, signifies the proportional capability of a given quantity of any substance to absorb and retain caloric; or that disposition or property by which various bodies respectively require more or less of this fluid to superinduce any given temperature in a given mass. See CALORIC and TEMPERATURE.

That this capacity varies in different bodies, and even in the same substance in different states, may be easily shewn. If the quantities of heat necessary to be added to or taken from bodies, in order to produce equal changes in their temperature, were in all cases proportional to their respective quantities of matter;—as if, for example, it would require the same quantity of this fluid to heat a pound of water, a pound of oil, or a pound of mercury twenty degrees; this would, of course, indicate that their capacities were equal; but if, on the contrary, it should be found that the same quantity of caloric applied to these various substances should produce different changes in the temperature of equal quantities, or equal changes in the temperature of different quantities of each, it would follow that their capacities for this fluid must proportionally vary. Let us conceive that having three several pounds of water at the temperature of 110° of Fahrenheit's thermometer in separate vessels, there be added

to the first a quantity of water at 50°, to the second a quantity of spermaceti oil also at 50°, and to the third a quantity of mercury at the like temperature of 50°; and that each of the mixtures be stirred together, and the addition continued, till they have all assumed throughout a common temperature of 70°. Now, as each of the pounds of water has, in this case, been deprived of an equal quantity of caloric, (viz. as much as was necessary to raise its temperature 40°, or from 70° to 110°,) the *absolute* capacities of the whole of the water, the oil, and the mercury, which have been added, must of course be equal, whatever be the quantity of each; each of them having absorbed an equal quantity of heat. On comparing the quantities of these latter substances, however, it will be found that we have employed in the experiment about 2 pounds of water at 50°, 4 pounds of oil, and near 60 pounds of mercury, each of which has been heated 20°; so that it requires as much caloric to heat one pound of water 20° as to produce the same effect on two of oil, or thirty of mercury; and their *relative* capacities are therefore inversely in this proportion.

Nor is it only among substances which essentially differ in their nature that this difference is found: the same body in different states of existence presents us with equal varieties in its capacity. A change in this respect is producible in three ways: by mechanical compression or dilatation, by chemical combination, or by the action of heat itself; of each of which we shall say a few words.

With regard to the first, the general fact appears to be, that wherever a body is by any means condensed, its capacity becomes diminished; but that where it is dilated or enlarged in its bulk, it is proportionally increased. Thus, if a thermometer be suspended in a receiver, and a quantity of air condensed into it, the mercury will rise; a part of the caloric which is contained in the air being, as it were, squeezed out by its compression, and forced into the mercury in the bulb, whose temperature is consequently raised: if, however, on the contrary, the air be rarefied, the thermometer will indicate cold; the capacity of the air in the receiver being increased by its rarefaction, and a portion of the caloric in the contiguous bodies consequently absorbed, whereby their temperature is lowered and their bulk diminished. It seems probable also that the heat produced by friction or percussion is, in like manner, to be referred to this kind of diminution in the capacity of the subject.

The second mode of changing the capacities of bodies is by their chemical combination; and it is perhaps true, that there is no combination unaccompanied by such a change. In some instances this takes place in a very remarkable degree, and it is from hence that we derive the effects of caloric and frigorific mixtures. If, for example, a quantity of sulphuric acid, diluted with an equal measure of water, be poured on a quantity of crystals of Glauber's salt recently powdered, the capacity of the compound is considerably greater than that of its component ingredients, it becomes therefore strongly absorbent of caloric, which it attracts from the bodies in its vicinity, and a quantity of water in a phial placed in the mixture will be soon frozen. The converse takes place in the combination of water and sulphuric acid. The capacity of the compound becomes diminished by the mutual attraction of the particles of its ingredients; a portion of the caloric which it contains is therefore extracted, and heat is produced by its emission.

The third case of change of capacity, by the action of heat itself, is perhaps productive of more important effects in nature than either of the other two. The capacities of all bodies are increased in some proportion to the dilatation of their bulk, and the disaggregation of their constituent

particles as well by the agency of caloric as by any other cause. Hence, when a solid is fused, or a liquid resolved into vapour, cold is produced by the augmentation of its capacity; and *e converso*, when steam is condensed, or congelation takes place, heat is developed by its diminution. Thus, if equal quantities of pounded ice and water, each at 32° of Fahrenheit, be exposed to heat in two similar vessels in a water-bath, the water will be heated to 178° before the ice is all dissolved, the water produced from which will of course still remain at 32° , so that the increase of capacity in the ice, during its solution, is sufficient to enable it to absorb, without any elevation of its temperature, as much caloric as has raised the temperature of an equal quantity of water 146° ; and the like quantity is also again emitted, on its becoming again congealed. If a quantity of water be exposed without agitation to a degree of cold equal to 24° or 25° , it will frequently acquire this temperature without freezing; but as soon as congelation begins, the thermometer will immediately rise to 32° , and the whole will remain at that temperature till all the water is converted into ice. From the quantity of heat which is absorbed by ice during its solution, and the relative capacities of ice and water, which he conjectured from his experiments to be as 9 to 10, Dr. Crawford concludes that, as water on freezing appears to give out 146° , and this constitutes $\frac{1}{10}$ of all that it contains, it is probable that the temperature of a body which was entirely divested of heat would be 1460° below the freezing point, or 1428° below the zero of Fahrenheit's thermometer.

This latter change of capacity appears manifestly to be absolutely essential to the well-being of the universe, as affording a constant modification of the action of heat and cold, whose effects would otherwise be inordinate. If this did not take place, the whole of a mass of water which was exposed to a temperature above the boiling point would be instantly dissipated in vapour with explosion. The fact, however, is, that the capacity of those portions of the liquid which are successively resolved into vapour becomes thereby sufficiently augmented to enable them to absorb the superabundant caloric, as fast as it is communicated; and it is for this reason that boiling water in an open vessel never reaches a higher temperature than 212° . The polar ices would all instantaneously dissolve, whenever the temperature of the circumambient air was above 32° , if it were not that each particle absorbs a quantity of caloric in its solution, and thereby generates a degree of cold which arrests and regulates the progress of the thaw; and the converse of this takes place in congelation, which is in its turn moderated by the heat developed in consequence of the diminution of capacity, which takes place in the water during its transition to a solid state.

CAPALITA, in *Geography*, a large town of North America, in the province of Guaxaca. The adjacent country abounds with sheep, cattle, and excellent fruit.

CAPAN, in *Commerce*, an East Indian coin worth 3*d.* sterling.

CAPANABASTIA, in *Geography*, a town of North America, in the province of Chiapa in Mexico; 70 miles S. E. of Chiapa des Espagnoles.

CAPARACOCK of Buffon, in *Ornithology*, the hawk-owl of English writers, *Strix Hudsonia* of Gmelin, and *Strix freti Hudsonis* of Brisson.

CAPARASON, or CAPARISON, the covering or cloathing laid over an horse; especially a sumpter, or horse of state.

The word is Spanish, being an augmentative of *cape*, caput, head.

Anciently the caparisons were a kind of iron armour, wherewith horses were covered in battle.

CAPAS ISLANDS, in *Geography*, small islands near the east coast of Malacca, in the East Indies. N. lat. about 5° . E. long. $103^{\circ} 30'$.

CAPASH, a kind of head-dress worn by the women of Candia. It is of a stiffened fine muslin, and is made so as to stand up very high, and extends out a great way on the right side. Pococke's Egypt, vol. ii. part ii. p. 10.

CAPA-VELA, in *Botany*. (Rheed. Mal.) See CLEOME PENTAPHYLLA.

CAPE ASTER. See CINERARIA AMELLOIDES.

CAPE JASMINE. See GARDENIA FLORIDA.

CAPE, in *Geography*, a head-land; or the extremity of a piece of land, or *promontory*, running out beyond the rest, into the sea.

CAPE ABACOU, lies near the west end of the south coast of the island of St. Domingo, N. lat. $18^{\circ} 4'$. W. long. 74° .—C. *St. Agnes*. See ST. AGNES.—C. *Agua*, a cape of Spain, on the coast of Murcia, in the Mediterranean. N. lat. $37^{\circ} 32'$. W. long. $0^{\circ} 37'$.—C. *Aguer* or *Geer*. See AGUER and GEER.—C. *Agria*, a double point of South America, on the coast of Peru. S. lat. $6^{\circ} 38'$. W. long. $80^{\circ} 55'$.—C. *Aguillas*. See AGUILLAS.—C. *Ajo*, a cape of Spain, on the coast of Biscay, in the Atlantic. N. lat. $43^{\circ} 32'$. W. long. $3^{\circ} 18'$.—C. *Albatel*. See ALBATEL.—C. *Albania*. See ALBANIA.—C. *Algar*, a cape on the N. W. coast of the island of Majorca. N. lat. $39^{\circ} 40'$. E. long. $2^{\circ} 38'$.—C. *Alice*, a cape of Naples, on the E. coast of Calabria Citra, in the gulf of Tarento. N. lat. $39^{\circ} 30'$. E. long. $17^{\circ} 20'$.—C. *Amanfo*, a cape on the S. E. coast of the island of Corsica, and northern part of the entrance into the bay of Bonifacio.—C. *Amboise*. See AMBEEZES.—C. *Ambra*. See AMBRA.—C. *Amoufse*. See AMOUSHE.—C. *Anciola*, a cape on the W. coast of the island of Cabrera, which see. N. lat. $39^{\circ} 6'$. W. long. $3^{\circ} 8'$.—C. *Ancon*, or *Ancoe*, the N. point of the island of Chiloe, in the S. Pacific Ocean. S. lat. 42° . W. long. 80° .—C. *Anderville*, a cape of France, on the N. E. coast of the department of the Channel; 13 miles W. N. W. of Cherbourg. N. lat. $49^{\circ} 43'$. W. long. 3° .—C. *Andrea*, and *St. Andrew's*. See ST. ANDREW'S.—C. *Anguada*. See ANGUADA.—C. *Anguillas*, *Anguille*, *Ann* and *Anne*. See the Articles.—C. *St. Anthony*, a cape on the E. coast of Newfoundland. N. lat. 51° . W. long. 56° ; also, the N. W. point of Staten land, in the straits of Le Maire. S. lat. $54^{\circ} 46'$. W. long. $63^{\circ} 47'$.—C. *Antio*, *Antongil*, *Antonio*, *Apollonia*, and *Arca*. See the respective Articles.—C. *Argent*, a cape on the E. side of Newfoundland. N. lat. 50° . W. long. $55^{\circ} 15'$.—C. *Argentaro*. See ARGENTARO.—C. *Argentera*, a cape on the W. coast of Sardinia, 2 miles W. of Argentera. N. lat. $39^{\circ} 28'$. E. long. $8^{\circ} 36'$.—C. *Armi*, a cape of Naples, on the southern coast of Calabria Ultra. N. lat. $37^{\circ} 52'$. E. long. $16^{\circ} 1'$.—C. *Ash oune-mon-kar*, a cape of Algiers, in the Mediterranean. N. lat. $37^{\circ} 15'$. E. long. $5^{\circ} 10'$.—C. *Asinara*, the N. W. point of Sardinia. N. lat. $40^{\circ} 58'$. E. long. $8^{\circ} 13'$.—C. *Ava*, *St. Augustine*, *Baba*, *Baffa*, and *Bajador*. See the several Articles.—C. *Bainetta*, a cape on the south west of the island of St. Domingo, near a village of the same name. N. lat. $18^{\circ} 13'$. W. long. $72^{\circ} 51'$.—C. *Bajole*. See BAJOLE.—C. *Bajona*, a cape on the E. coast of Africa. S. lat. $15^{\circ} 15'$. E. long. 39° .—C. *Balaad*, lies on the N. coast of Morocco, in the Mediterranean. N. lat. $35^{\circ} 32'$. W. long. $3^{\circ} 46'$.—C. *Ballaghan*, *Ballard*, *Barbas*, *Bardislan*, *Barfleur*, *Barnabas*, *St. Bartholomeu*, *Bassos*, *Baxos*, *Bear's*, and

and *Beata*. See the respective Articles.—*C. Becur*, a cape on the coast of Egypt, in the Mediterranean; 4 leagues N. N. E. of Alexandria.—*C. Bede, Bedford*. See the Articles. *C. Begu*, a cape of Spain, on the coast of Catalonia, in the Mediterranean. N. lat. $41^{\circ} 57'$. E. long. $2^{\circ} 19'$.—*C. Berberia*, a cape on the W. coast of the island of Formentera, in the Mediterranean. N. lat. $38^{\circ} 41'$. E. long. $1^{\circ} 36'$.—*C. de Berelos*, a cape on the N. coast of Egypt, in the Mediterranean; 30 miles W. of Damietta. N. lat. $31^{\circ} 29'$. E. long. $31^{\circ} 16'$.—*C. Bermejo*, a cape on the E. coast of Majorca. N. lat. $39^{\circ} 30'$. E. long. $4^{\circ} 38'$.—*C. Bernard*, a cape of Egypt on the N. coast, in the Mediterranean. N. lat. $31^{\circ} 6'$. E. long. $33^{\circ} 43'$.—*C. Blanco*, a cape of South America, on the coast of Terra Firma. N. lat. $10^{\circ} 28'$. W. long. $67^{\circ} 16'$; also, a cape on the S. coast of the island of Sicily. N. lat. $37^{\circ} 28'$. E. long. $13^{\circ} 11'$.—Also, a cape on the S. coast of the island of Corfu. N. lat. $39^{\circ} 28'$. E. long. $20^{\circ} 4'$.—Also, a cape on the S. W. coast of the island of Cyprus. N. lat. $35^{\circ} 12'$. E. long. $32^{\circ} 15'$.—Also, a cape of Spain, on the coast of Asturia. N. lat. $43^{\circ} 26'$. W. long. $6^{\circ} 37'$.—Also, a cape on the W. coast of the island of Ivica. N. lat. $39^{\circ} 2'$. E. long. $1^{\circ} 33'$.—Also, a cape on the S. coast of the island of Majorca. N. lat. $39^{\circ} 22'$. E. long. $2^{\circ} 59'$. For other capes of this denomination, see *BLANCO*.—*C. St. Blaise*. See *BLAISE*.—*C. St. Blaise*, the outermost point of Mossel bay, in the Cape of Good Hope. S. lat. $34^{\circ} 10'$. E. long. $22^{\circ} 18'$.—*C. St. Blas*, a cape of America, on the coast of the Isthmus of Darien. N. lat. $9^{\circ} 36'$. W. long. $79^{\circ} 24'$.—*C. Bluff*, a cape on the E. coast of Labrador. N. lat. 53° . W. long. $55^{\circ} 30'$.—*C. Boev*, a cape on the W. coast of the island of Sicily. N. lat. $37^{\circ} 51'$. E. long. $12^{\circ} 45'$.—*C. Bogachua*, a cape on the south-east of Arabia; 150 miles S. W. of Cape Fartash. N. lat. $14^{\circ} 15'$. E. long. $48^{\circ} 15'$.—*C. Bijador and Bon*. See the Articles.—*C. Bonandria*, a cape of Africa, on the coast of Barbary, in the Mediterranean. N. lat. $32^{\circ} 20'$. E. long. $23^{\circ} 14'$.—*C. Bonaventura*, *Bonaventure*, and *Bonavilla*. See the Articles.—*C. Brasfa*, a cape of America, on the N. coast of the Isthmus of Darien. N. lat. $9^{\circ} 22'$. W. long. $80^{\circ} 10'$.—*C. Break*. See *BREAK*.—*C. Bredanach*, a cape of Scotland, on the W. coast of the island of Rum.—*C. Brema*. See *BREMA*.—*C. Breton*. See *BRETON*.—*C. Brett*, a cape on the E. coast of the northernmost island of New Zealand. S. lat. $35^{\circ} 10'$. E. long. $174^{\circ} 37'$.—*C. Brißol, Broyle, and Buller*. See the respective Articles.—*C. Burela*, a cape of Spain on the N. coast of Galicia. N. lat. $43^{\circ} 41'$. W. long. $7^{\circ} 7'$.—*C. Burulaque*, the northern point of Zebu or Sebu, one of the Philippine islands. N. lat. $11^{\circ} 6'$. E. long. $122^{\circ} 31'$.—*C. Burzano*, a cape of Naples near the southern extremity of Calabria Ultra, on the E. coast. N. lat. $37^{\circ} 56'$. E. long. $16^{\circ} 29'$.—*C. Buslo*, a cape of Spain, on the coast of Asturia. N. lat. $43^{\circ} 37'$. W. long. $6^{\circ} 14'$.—*C. Butifaras*, a cape on the S. W. of Minorca. N. lat. $39^{\circ} 48'$. E. long. $4^{\circ} 28'$.—*C. Byron*, the S. W. extremity of New Iceland, in the Pacific ocean. S. lat. $2^{\circ} 30'$. E. long. $149^{\circ} 2'$.—Also, a cape on the N. E. coast of New Guernsey. S. lat. $0^{\circ} 40'$. E. long. $164^{\circ} 49'$.—Also, a cape on the E. coast of New Holland. S. lat. $28^{\circ} 37'$. E. long. $153^{\circ} 30'$.—*C. Cabron*. See *CABRON*.—*C. Caccia*, a cape on the W. coast of Sardinia, 13 miles W. of Algeri.—*C. Caglia*. See *CAGLIA*.—*C. Calbach*, a cape on the W. coast of Porto Rico. N. lat. $18^{\circ} 28'$. W. long. $31^{\circ} 34'$.—*C. Calibon*, a cape on the N. coast of the island of Java. S. lat. $6^{\circ} 18'$. E. long. $110^{\circ} 45'$.—*C. Camboja*, the southern extremity of the kingdom of Camboja, on the eastern coast of the gulf of Siam. N. lat. $9^{\circ} 10'$. E. long. $104^{\circ} 30'$.—*C. Cameron*, a cape of North America, on the coast of Honduras. N. lat. $15^{\circ} 30'$.

W. long. $85^{\circ} 54'$.—*C. Campbell*, a cape on the E. coast of New Zealand. S. lat. $41^{\circ} 44'$. W. long. $188^{\circ} 49'$.—*C. Canan*. See *MEJURATA*.—*C. Canet*, a cape of Spain, on the coast of Valencia. N. lat. $39^{\circ} 40'$. W. long. $0^{\circ} 1'$. Other capes, that occur in the sequel, are mentioned under their appropriate names, and those of the districts and countries to which they belong.

CAPE of Good Hope, a promontory of the southern part of Africa, first discovered in 1487 by Bartholomew Diaz, a Portuguese officer of distinguished sagacity, experience, and fortitude, and called by him, on account of the violence of the tempests with which he encountered, "Cabo Tormentoso," or Stormy Cape; but his master, John II. king of Portugal, entertaining no doubt of his having found the long desired route to India, gave it a name of better omen, viz. "The Cape of Good Hope." Diaz merely deferred this promontory; but the violence of the winds, the shattered condition of his ships, and the turbulent spirit of his sailors, compelled him to return, after a voyage of sixteen months. In 1497, Emanuel, king of Portugal, inheriting the enterprising genius of his predecessors, and persisting in their grand scheme of opening a passage to the East Indies by the Cape of Good Hope, equipped a squadron, consisting only of three vessels, for this important voyage, and gave the command of it to Vasco de Gama, a man of noble birth, and possessed of virtue, prudence, and courage, equal to the station. Accordingly Gama set sail from Lisbon on the 9th of July, and, after struggling for four months with contrary winds, reached the Cape on the 20th of November. During an interval of calm weather he doubled that formidable promontory, which had so long been the boundary of navigation, and, after touching at several parts along the eastern African coast, terminated his voyage at Calicut on the coast of Malabar. See *CALICUT*. Vasco de Gama, however, made no attempt to form a settlement at the Cape. Next to Vasco de Gama was the Portuguese admiral Rio d'Infanté, who, in his voyage to India in 1498, went ashore, and, on his return, strongly recommended to his government the establishment of a colony on the southern continent of Africa; and he fixed upon the mouth of a river for that purpose, to which was given his own name, and which is now called the "Great Fish River." Some other attempts, by different Portuguese navigators, were made to colonize the Cape, but they all failed. After this the English and Dutch frequently visited the bays of the Cape. The English, in their outward-bound voyages, had a custom of burying their dispatches for the directors, and of pointing out where they were to be found, by cutting a sentence to that effect on some large blue stone laid on a particular spot. The intelligence, engraven on the stone, was usually limited to the name of the ship and captain, the date of her arrival and departure, and ended with, "Look for letters (in such or such direction) from this stone." Two or three stones of this kind are fixed in the castle-wall, and are still legible. The Dutch used to bury, on a certain spot in Robben island, a register of the state of their vessels and cargoes outward-bound, which the next ship, in coming home, took up and carried to Holland for the information of the directors. In this manner the English, the Dutch, and the Portuguese, continued, for more than a century, to refresh at the Cape, without any design on the part of the two former of appropriating the soil, until the year 1620, when the commanders of two fleets of English ships, bound for Surat and Bantam, took a formal possession of the soil for, and in the name of, king James of Great Britain, because they discovered that the Dutch intended to establish a colony there in the following year. It was not, however, until a period of more than 30 years had expired

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expired after this event, that Van Riebeck, surgeon of a ship that put into the Cape for the usual purpose, made representations of the richness of the soil, the mildness of the climate, the advantages it would give to the Dutch, as a colony, over other nations, whose ships would all be obliged to touch there, and, above all, the barrier it would afford to their Indian dominions; which prevailed on the directors of the Dutch East India Company to form a regular establishment at the Cape. Van Riebeck was appointed admiral of four ships properly equipped for such an expedition, and, on his arrival at the Cape, governor in chief, with full power to establish a settlement. He no sooner proposed than concluded a treaty; and the Dutch took immediate possession of the Cape, which was surrendered to them by the natives with great solemnity. Van Riebeck erected a square fort, containing lodgings, warehouses, and an hospital for the sick, and raised outworks and batteries to secure their settlements from all attacks. The original intention of the Dutch seems to have been to limit their possessions to the Cape peninsula, and the two bays that are divided by the isthmus; considering it only, as it had hitherto been, a place for refreshing and refitting their ships. But the number of settlers that joined them from time to time, in consequence of the placard which they published for their encouragement, made it necessary to cross the isthmus, and, by presents and promises, to obtain from the natives the cession of a tract of land, to which they gave the name of "Hottentots' Holland." The natives had probably no idea of resigning, for ever, to a foreign nation, the ground that was necessary for feeding their own cattle; but conceived it could only be intended for temporary use, and that, in time, they would depart from the country, as other Europeans had done for the last century and a half: but, when they observed them building houses and fortifications, sowing and planting the ground, and rearing their own cattle, they began to be jealous of the encroachments of their new neighbours, and commenced hostilities for the purpose of expelling them. These hostilities terminated in the further extension of the Dutch settlement, and in an increase of troops and colonists from Europe. Still, however, the Dutch East India Company endeavoured to limit the Cape to the original design of a port for refreshing their ships. They threw every obstacle in the way of its becoming a flourishing settlement; allowed no trade whatsoever but that which passed through the hands of their own servants, and made it dependent on the governor-general of Batavia; concluding that the settlers would thus be made equally submissive to their orders from Europe, and from the seat of their wealth and influence in the East. A colony, in such a state, with their declining commerce, entailed upon them a burden and expence too heavy for them to bear; and little doubt was entertained of their inclination to part with it for a moderate sum of money, just before the French revolution and its destructive consequences unsettled the affairs of all Europe. Overtures to this effect were intended to be made by England about the time when the above unfortunate event took place. It became wise and necessary, however, to recur to other measures for obtaining possession of this Dutch colony. Accordingly, an expedition was sent out for this purpose; which was commissioned not to act in an hostile manner, but to hold the Cape in defence and security for, and in the name of, the prince of Orange, who, having departed from Holland, furnished letters dated from London to this effect. Many of the colonists had, in the mean while, imbibed French principles, and became clamorous to declare themselves, by some public act, a free and independent republic: they pre-

pared to plant the tree of liberty, and established a convention, whose first object was to make out proscribed lists of those who were either to suffer death by the guillotine, or to be banished out of the colony. The persons so marked out to be the victims of an unruly rabble were selected from among the most worthy people in the settlement, and most of them were members of the government. The slaves, whose numbers of grown men are about five to one of male whites, had also their meetings to decide upon the fate of the free and independent burghers, when the happy days of their own emancipation should arrive.

In this state of things the British fleet appeared before the bay; and it became necessary to commence hostilities. The rocks of Muizenberg were soon cleared by a few shot from a man of war, and the regular troops retreated to Wynberg, a tongue of land projecting from the east side of the Table mountain, and about eight miles from Cape-town. The British troops, led on by general sir James Craig, under the orders of sir Alured Clarke, marched to attack the enemy on their elevated post, and aided by the sailors, soon obliged them to retreat within their lines. A capitulation was proposed and accepted, in September 1795; and the next day it was concluded between the two parties. By the 6th article of the treaty of peace at Amiens in March, 1802, it was stipulated, that the port of the Cape of Good Hope should remain to the Batavian republic, in full sovereignty, in the same manner as it did previous to the war; but that the ships of every kind belonging to the other contracting parties should be allowed to enter the said port, and to purchase necessary provisions, without paying any other impost than such as the Batavian republic demands the ships of its own nation to pay.

In order to form a just idea of the dimensions of the Cape settlement, we may suppose a straight line to be drawn from the southern point of the Cape peninsula, which, however, is not the southernmost point of Africa, in the direction of east by north, and this line will intersect the mouth of the Great Fish river (the Rio d'Infanté of the Portuguese), which is now considered as the eastern boundary of the colony. The length of this line is about 580 miles. Again, if from the same point a straight line be drawn in the direction of north, with a little inclination westerly, it will fall in with the mouth of the river "Kouffie," the northern boundary of the colony, at the distance of about 315 miles. Moreover, if from the mouth of the Great Fish river, a line drawn in the direction of north-north-west, be continued to the distance of 225 miles, to a point behind the Snowy mountains called "Plettenberg's land-mark," and from thence be continued in a circular sweep inwards to the mouth of the river "Kouffie" upwards of 500 miles; these lines will circumscribe the tract of country which constitutes the colony of the Cape of Good Hope. By reducing this irregular figure to a parallelogram, it will be found to comprehend an area of at least 120,000 square miles; and as the whole population of whites, blacks, and Hottentots, within this area, amounts only to about 60,000 persons, every two square miles may be said to have at least *one* human creature allotted to it. But as this desert state of the colony is less owing to the natural defects of the country, than to the regulations under which it has been governed, the population, compared with the extent of surface, ought not to be taken as the test of the intrinsic value of the settlement; since the population of any country, under a moderate climate, will, in the natural course of things, always rise to a level with the means of subsistence. If we estimate the soil of the Cape by the abundance or scarcity, the luxuriance or poverty, of the native plants, independently of the climate, it would be pronounced one of the poorest in the known world; for seven

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parts in ten of the above-mentioned surface are, for a great part of the year, and some of them at all times, altogether destitute of verdure. The upper regions of all the chains of mountains are naked masses of sand-stone; the valleys beneath them are clothed with grass, with thickets, and in some cases with impenetrable forests. The inferior hills or knolls, whose surfaces are generally composed of loose fragments of sand-stone, as well as the wide sandy plains that connect them, are thickly strewed over with heaths and other shrubby plants, exhibiting to the eye an uniform and dreary appearance. In the lowest parts of these plains, where the waters subside, and, filtering through the sand, break out in springs upon the surface, vegetation is somewhat more luxuriant. In such situations the farm-houses are generally placed; and the patches of cultivated ground contiguous to them, like the "Oases" in the sandy deserts, may be considered as so many verdant islands in the midst of a boundless waste. Of such plains and knolls is the belt of land composed, that lies between the first chain of mountains and the sea-coasts. Soils, in this tract of country, are generally either a stiff-clay, impenetrable by the plough till they are soaked by much rain, or light and sandy, tinged with red and abounding with small round quartz pebbles. A black vegetable mould seldom appears except in patches of garden-ground, vineyards, and orchards that surround the habitations, where, by long culture, manure, and the fertilizing influence of springs or rills of water, the soil is so far meliorated as to admit the spade at all seasons of the year. The extensive plains, known in the colony by the Hottentot name of "Karoo," which are interspersed between the great chains of mountains, exhibit a more dismal appearance than the lower plains, which are chequered with patches of cultivated ground; and their hard surfaces of clay, glittering with small crystals of quartz, and condemned to perpetual drought and aridity, are ill adapted to vegetation. The hills that break these barren plains, are chiefly composed of fragments of blue slate, or masses of felspar, and argillaceous limestone. However, in those Karroo plains, that are tinged with iron, and that are capable of being watered, the soil is extremely productive. In such situations, more especially in the vicinity of the cape, they have the best grapes, and the best fruit of every sort. The climate of the Cape is not unfriendly to vegetation; but it is so situated, within the influence of periodical winds, that the rains are very unequal, descending in torrents during the cold season, though hardly a shower falls to refresh the earth in the hot summer months, when the dry south-east winds prevail. These winds blast the foliage, blossom, and fruit of all those trees that are not well sheltered; nor is the human constitution secure against their injurious influence. They relax both the body and mind, and deaden their powers of energy and activity. As a protection from these winds, the colonists who inhabit the nearer side of the first chain of mountains, beyond which their effect does not very sensibly extend, divide that portion of their ground, which is appropriated to fruit groves, vineyards, and gardens, by oak screens; but they leave their corn lands altogether open. Indeed, a cape boor bestows no more labour on his farm than is absolutely necessary; and as grain is mostly reaped before the south-east winds are set in, the enclosure of the arable land is omitted. The temperature of the climate at the Cape is remarkably affected by local circumstances. During the winter months, May, June, and July, the mean temperature, according to the statement of Kirwan (*Estimate, &c.* p. 102), seems to be from 45° to 55°; the heat scarcely exceeds 64°, and seldom falls so low as 34°; in summer the

thermometer is generally between 70° and 80°, and sometimes between 80° and 90°, but scarcely ever exceeds 95°; the south-east wind, he adds, is the coldest. Mr. Barrow informs us (*ubi infra*), that there is a difference of at least from 6 to 10 degrees of Fahrenheit, in the summer months, between Cape Town and Wynberg, within a distance of only about 7 or 8 miles; which arises from the latter place being situated on the windward side of the Table mountain, and the former lying to leeward of it. The variation of climate, to which the Table valley is subject, led a British officer to observe, that those who inhabited it were either in an oven, or at the funnel of a pair of bellows, or under a water-spout. On the Cape side of the mountains the thermometer rarely descends below 40°; but on the elevated Karroo plains, within the mountains, it is generally, in the winter months, below the freezing point by night, and from 70 to 80 in the middle of the day. In order to account for the intense cold of the Karroo plains, Van Humboldt adduces the chemical decomposition of the atmospheric air. As fat and clayey earths are strongly disposed to attract the oxygen from the atmosphere, by which the azotic gas is let loose: this gas entering again into combination with fresh oxygen, of the superincumbent stratum, in an increased proportion, forms nitric acid, from which salt petre is generated. The consequence of this formation which actually takes place in those plains, must necessarily be a great diminution of temperature.

We may now proceed to observe, that the great scarcity of water in summer is much more unfavourable to an extended cultivation than either the soil or the climate. The torrents of rain that descend for about four months in the year, deluging the whole country, disappear suddenly in the deep channels that intersect the country, and in consequence of their rushing with rapidity and violence into the sea, and leaving the deeply sunken beds of the rivers nearly dry, afford no sufficient supply of water to answer the purposes of irrigation. The periodical rivulets, and the streams that issue from the mountain springs, are either absorbed or evaporated before they arrive at any great distance from their sources; so that in this extensive colony one can scarcely say that there is a single navigable river. The two principal rivers, on the western coast, are the "Berg," or Mountain river, which rises in the mountains that enclose the vale of Drakenstein, and falls into St. Helena bay, and the "Oliphant," or Elephant's river, which, after collecting the streamlets of the first chain of mountains in its northerly course along their feet, empties itself into the Southern Atlantic in S. lat. 31° 30'. Although both these rivers have permanent streams of water, sufficiently deep to be navigable by small craft to the distance of about 20 miles up the country, yet the mouth of the former is choked up with a bed of sand; and across the latter is a reef of rocks. On the south coast of the colony the permanent rivers of any magnitude are the "Broad" river, which is discharged into St. Sebastian's bay, crossed near its mouth by a bar of sand, but navigable within this bar by small craft about 30 miles up the country, in which extent there are scarcely half a dozen farm-houses; the "Gauritz" river; the "Knyfna;" the "Keurboom;" the "Camtoos;" the "Zwartkops;" the "Sunday;" and the "Great Fish" rivers; which see respectively. All these rivers are well stocked with perch, eels, and small turtle, and, to a certain distance from the sea-coast, they abound with almost every kind of sea-fish peculiar to this part of the world. Beside these rivers, the whole slip of land, stretching along the sea-coast, between the entrance of False bay and the Great Fish river, is intersected

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sected by streamlets, whose waters are neither absorbed nor evaporated; but they generally run in such deep chasms, that they are of little use towards the promotion of agriculture by the aid of irrigation. In order to account for these deep chasms or cavities, and the general scarcity of springs, notwithstanding the quantity of rain that annually falls at the Cape, Mr. Barrow suggests the following considerations. All the continued chains of mountains in Southern Africa are composed of sandstone, resting upon a base of granite. The granite base is sometimes elevated considerably above the general surface of the country, and sometimes its upper part is sunk as far beneath it. In situations where the former circumstance occurs, numerous springs are found, as in the Table mountain, where, on every side, copious streams of pure limpid water, filtered through the immense mass of superincumbent sandstone, glide over the impenetrable surface of granite, and furnish an ample supply to the whole town, the gardens, and the adjacent farms. But in those places where the sandstone continues to descend below the surface, and the upper part of the granite base is sunk beneath the general level of the country, the springs that make their appearance are few and scanty. From these facts it is inferred, that the cisterns or cavities in the sand-stone mountains, being corroded in the lapse of ages, to a greater depth than the openings or conduits, which might, perhaps, at one time have given their waters vent, the springs can no longer find their way upon the surface, but oozing imperceptibly between the granite and the sand-stone, below the general level of the country, glide in subterraneous streams to the sea. It is a well known fact, that on almost every part of the isthmus that connects the mountainous peninsula of the Cape to the continent, fresh water may be procured at the depth of 10 or 12 feet below the sandy surface. Other facts of a similar nature serve to evince the erroneoufness of the opinion, that has generally prevailed, that the several bays of the colony cannot, without great difficulty, if at all, be supplied with fresh water. This great depth of the commencement of the granite base below the surface may also better account for the most considerable rivers of Africa losing themselves in the sand, before they reach the sea, than by supposing the interior parts of this continent to be lower than the level of the ocean.

Another circumstance that has very much contributed to retard the cultivation of the territories adjoining to the Cape, is the extreme indolence of the colonists. In this fine climate they engage in little or no manual labour. The extent of the forests, beginning at Mossel bay, and running eastward parallel to the sea-coast, is at least 250 English miles, and the breadth from the base of the mountains to the sea is 10, 15, and in some places, 20 miles. Of this tract a great part is composed of large and beautiful plains, intersected by numerous rivers, and abounding in lakes full of excellent fish. The ground is well adapted either to pasturage or tillage, and capable of complete irrigation; but the farmers here, as well as in all other parts of the colony, are lazy beyond description; the grounds held by each being sufficient for a great number of industrious families. It has been said, that the slip of land between the first chain of mountains and the sea-coast, and from Zwellendam to Algoa bay, if well stocked with inhabitants, so that each would be under a necessity of labouring for a subsistence, would not only be able to furnish a supply of grain for the whole colony, but afford also a surplus for exportation. But though this opinion may not be strictly just, yet Mr. Barrow is confident, that, with the addition of the tract of country between the north range of mountains and the west coast, and from

St. Helena bay to the Cape, the whole mass of people within the present limits of the colony might be more comfortably subsisted than they now are, and have an abundance of corn, cattle, wine, and other necessaries, over and above, for a garrison of 5000 men, and for a fleet containing an equal number. But in order to make the country produce this supply, it will be necessary to procure a new race of inhabitants, or to change the nature of the old ones.

It is impossible, says this ingenious writer, to convey, by any description, an adequate idea of the condition of the peasantry of the Cape of Good Hope; as it is so inconceivably different from that of the same class in Europe, or indeed in any other part of the world. In the miserable hovels of the Cape boors salted beef, or flesh of the larger kinds of game, will be found hanging in the chimney, and the whole or greater part of a slaughtered sheep may be seen suspended from the roof. A Cape boor never works. His greatest and most pleasing exertion is the killing of game. But in this kind of exercise he manifests no energy or activity, and submits to no fatigue. A Dutch boor never traverses the heath on foot, but generally fires from the saddle; and even avoiding the fatigue of carrying his musket, he is followed by a Hottentot boy, trained to ride or run after him as his armour-bearer. It is a mistaken notion, that the peasantry of the Cape are a poor and distressed people, overwhelmed with debt, burdened with taxes, and oppressed by the government in a variety of ways. This will sufficiently appear in the sequel of this article. But they are better fed, more indolent, more ignorant, and more brutal than any set of men, bearing the reputation of being civilized, upon the face of the whole globe. Instances frequently occur of their savage and inhuman treatment of the HOTTENTOTS, whom they retain in a state of connection and dependance, by violence and oppression on one side, and by want of energy and patient suffering on the other. This sanguinary character of many of the African colonists may, perhaps, be owing, in a certain degree, to the circumstance of their having been soldiers in German regiments serving abroad; where the least relaxation from a rigid system of discipline is followed up by the greatest severity of punishment. People of this description, having risen into affluence by the general prosperity that followed the conquest of the settlement, and indulging indolent habits and luxurious living, become no less gross in their persons than vulgar in their manners. Whilst they pay little attention to domestic and social intercourse, and are in a very culpable degree regardless of character, they are extremely tenacious of their rank. There are, however, many persons in the colony to whom these observations are not applicable; men, whose talents and information, propriety of conduct, and strict integrity, would command respect in any part of the world: but their number is not very considerable. The Malay slaves, in the service of the Dutch, are unaccountably preferred to the Hottentots; though they are generally much inferior to the latter in talents, and much more capricious, cruel, and revengeful. The proportion of slaves to whites, of both sexes and all ages in the Cape town, is not more than two to one; but that of slave men to white men is near five to one. The field slaves belonging to the farmers are not, however, nearly so well treated as those of the town; yet infinitely better than the Hottentots who are in their employ; the farmer, indeed, having a life-interest in the one, and only 25 years in the other, is a circumstance that may explain the difference of treatment. The one, also, is convertible property, which is not the case with respect to the other. The country slaves, notwithstanding, are ill fed, ill clothed,

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work extremely hard, and are frequently punished with great severity; sometimes with death, when rage overpowers the dictates of prudence and the feelings of compassion.

Mr. Barrow, in the 2d volume of his "Travels in Southern Africa," has stated and examined, very much in detail, the advantages which the Cape of Good Hope possesses, as a military station; as a port and naval station; and as a commercial emporium and territorial acquisition. By a military station Mr. Barrow means, not only a garrison for the defence of the settlement, but likewise a depôt, or place suitable for collecting and forming, so as always to have in readiness, a body of troops, either belonging to his majesty's regular regiments, or to the armies of the East India company, fitted and prepared for foreign service, and seasoned for the climate either of the East or West Indies. This ingenious writer is of opinion, that the Cape of Good Hope eminently points out such a station. Its geographical position on the globe is such as evidently to recommend it for this purpose. Its distance from the coast of Brazil is the voyage of a month; from the Dutch colonies of Surinam, Demarara, Berbice, and Essequibo, with the West India islands, six weeks; the same to the Red Sea; and two months to the coasts of Malabar and Coromandel. With the east and the west coasts of Africa and the adjacent islands, it commands, at all seasons of the year, a ready communication. It is so situated, just half way between England and India, in a temperate and wholesome climate, and productive of refreshments of every description, as to possess peculiar and very distinguishing advantages for a station and depôt, that would admirably suit the views and occasions of the East India company in particular. To England the Cape is more valuable as a point of effectual security to her Indian trade and settlements, than as a place of annoyance to other nations, or as to the means it affords of interrupting their commercial concerns. Considered as a naval station, the Cape would secure us a port for refreshing and refitting the ships of the East India company; as a station for ships of war commanding the entrance into the Indian seas; and as affording, by its geographical position, a ready communication with every part of the globe. Again, the Cape, considered in a commercial point of view, might be rendered extremely advantageous to the interests of the British empire, as an emporium of Eastern produce; as furnishing articles of export for consumption in Europe and the West Indies; as taking, in exchange, for colonial produce, articles of British growth and manufacture; and as a central depôt for the southern whale-fishery. The chief articles of colonial growth and produce consumed upon the spot, and exported to the East Indies, Europe, and America, may be comprised under the heads of grain and pulse, wine and brandy, wool, hides and skins, whale oil and bone, dried fruits, salt provisions, soap and candles, aloes, ivory, and tobacco. The wheat produced at the Cape is said to be as good and heavy as that of most other parts of the world. A load of this grain consists of ten "muids," or sacks, equal to 31 Winchester bushels; and a "muid," or $3\frac{1}{16}$ Winchester bushels, usually weighs 180 Dutch pounds; which are equal to $191\frac{1}{4}$ pounds English. The returns are from 10 to 70, according to the nature of the soil, and the supply of water. Barley, i. e. beer or big, is a productive grain at the Cape, and is only used for feeding horses. Rye is also a thriving grain, and is little used except for cattle in a green state, and oats, which run much into straw, and are fit only for horses as green fodder. Peas, beans, and kidney beans, Indian corn or maize, and various kinds of millet, may be supplied to any amount. However, the Cape, in its present state, is not capable of exporting any grain. Wine

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and brandy may be considered as the staple commodities of the Cape of Good Hope. Ten or twelve different kinds of wine are manufactured at the Cape, having a distinct flavour and quality according to the farms on which they are produced. The best bodied wine that is made at the Cape, is the Madeira, sent to Holland and the Dutch settlements in India, taken by the Americans in exchange for slaves, and purchased by English merchants. See CONSTANTIA.

The country boor sells his new wine to the merchants in the town, where it is adulterated in a variety of ways. The pipe is called a "legger," and contains 8 half aums or 160 gallons; each legger paying to government a duty, on entering the town, of 3 rix-dollars. The farmer generally receives from 20 to 30 rix-dollars per legger, which, after adulteration, is sold from 40 to 60, and frequently at the rate of 80 to 100 rix-dollars. Brandy might become a very important commodity as an article of export; but the cultivators of the vine have at present no proper distillatory apparatus, nor sufficient knowledge properly to conduct those which they have. It is exported at 80 to 160 rix-dollars per legger, and subject to the same toll, on entering the town, as wines: and both wine and brandy are liable to a further duty of 5 rix-dollars per legger on exportation. The whole export value of wines, including the Constantia, and the brandy, may amount, one year with another, to about 50,000 rix-dollars, or 10,000l. currency. Wool, which has till a late period been neglected, is likely to become a source of colonial revenue. It is said to have been sold, in its rough state, in the London market at 3s. to 3s. 6d. the pound. It admits of great improvement. The mutton of the Cape sheep is coarse and destitute of flavour. Hides and skins, both dried and salted raw, are an increasing article of exportation. The quantity of ox-hides exported may amount to between 2000 and 3000 annually, subject to a duty of $3\frac{1}{2}$ d. a piece. Those taken off cattle, killed in the country, are used as harness for their waggons, and thongs to supply the place of cordage. The skins of sheep, killed in the country, are converted into sacks, and employed as clothing for the slaves and Hottentots. Few are exported. The skins of the wild antelopes and leopard, though brought occasionally to the Cape market, hardly deserve mention as articles of export. The case is the same with regard to ostrich feathers; the annual amount of which is very trifling. The whole value of one year's exportation of this article does not exceed 1000 rix-dollars; of hides and skins of every description not more than 5000 or 6000 rix-dollars. All the whales which have been caught in the bays of the Cape are females of a small size, and yielding from 6 to 10 tons of oil each. The bone is small, and, on that account, of no great value. Under the head of dried fruits, the most important articles are almonds and raisins. The cultivation of vines admits of great improvement; better grapes are not produced in any part of the world than those at the Cape of Good Hope: but neither their wines nor raisins are properly managed. The almonds are, in general, very small, but of good quality; and as the trees thrive well in the driest and worst soils, the quantity of these nuts might be produced to an indefinite amount. Before the capture almonds sold from 1s. to 1s. 6d. sterling the thousand, and raisins from 2d. to 3d. a pound; but their price has since considerably advanced. Dried peaches, apricots, pears, and apples, are not only plentiful, but good of their kind. The whole value of dried fruit, shipped in the year 1802, amounted only to 2542 rix-dollars, subject to a duty on exportation of 5 per cent. Salt provisions are susceptible of great improvement, by curing them at Algoa bay, and bringing them down in small coasting vessels to the Cape. Salt is spontaneously produced

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within a few miles of Cape-town, by the evaporation of water in the salt lakes that abound along the west coast of the colony. Two kinds of fish, the "Hottentot" and the "Snook," are salted and dried in the sun in large quantities, for the use of the agricultural slaves, who eat them by way

correcting the bilious effects of bullocks' livers and other offal, that constitute a great part of their food. Salt-butter is a very material article for the consumption of the town, the garrison, and the navy, and also for exportation. That which comes from the Snowy mountains is accounted the best; but very little of it is good. Soap is manufactured by almost every farmer in the country, and furnishes in some parts the means of procuring cloaths and other necessaries at their annual visit to Cape-town. The unctuous part is chiefly derived from the fat of sheeps' tails, and the potash or barilla is the lixiviated ashes procured from a species of *falsola* called "canna," that grows abundantly on those parts of the Karroo, or deserts, that are intersected by periodical streams of water. Candles are seldom brought out of the country; but a vegetable wax, collected from the berries of a shrubby plant, the "*myrica cerifera*," plentiful on the dry marshy grounds near the sea-shore, is sometimes sent up to the Cape in large green cakes, and sold from 1s. to 1s. 3d. a pound. The tallow purchased at the Cape is hardly sufficient for the consumption of the town and garrison, and the candles made from it are seldom lower than 1s. 3d. a pound. The aloe *perfoliata*, or *succotrina*, is produced in large tracts of ground, many miles in extent, which are covered with spontaneous plantations of it; and especially in the district of Zwellendam, not far from Mossel-bay. A load of aloes at Cape-town is worth from 18l. to 20l. The total amount of this article, entered on the custom house books, in the course of 4 years from 1799 to 1802, was 341,927 lbs., value 25,665 rix-dollars. It is subject to an exportation duty of 16d. for every 100 pounds. Ivory is now become scarce, few elephants being found within the limits of the colony. The whole quantity exported in the course of 4 years amounted only to 5981 pounds, value 6340 rix-dollars. The hippopotamus, or sea-cow, whose teeth furnished the best ivory, is no longer within the limits of the colony. The colony is capable of producing great quantities of tobacco; however, very little is exported, though the Cape tobacco is said to be as good, when duly prepared, as that of Virginia. As all male persons, old and young, smoke in the Cape, and as American tobacco generally bears a high price, the consumption of that of native growth is considerable. The inferior sort is used by slaves and Hottentots. The total value of every kind of colonial produce, exported in 4 years, from 1799 to 1802, amounts to 300,925 rix-dollars, or 60,185l. currency. From the above detail it appears, that the Cape of Good Hope is, in its present condition, of very little importance to any nation; considered with regard to its articles of exportation.

The goods imported from England into the Cape, in 4 years, from 1799 to 1802, consisted of woollen cloths, Manchester goods, hosiery, haberdashery, and millinery, boats, shoes, and hats, cutlery, iron tools, stationary, bar and hoop iron, smiths' coals, household furniture, paint and oils, earthen ware, naval stores, tongues, hams, cheese, and pickles; and from India and China were imported Bengal, Madras, and Surat piece-goods, tea, coffee, sugar, pepper, spices, and rice. The Americans brought thither lumber, cargoes of deal plank, staves, balk, salt-fish, pitch, turpentine, &c.; and the Danes, Swedes, and Hamburgh ships assorted cargoes of iron, plank, French wines, beer, gin, Seltzer water, coffee, preserves, pickles, &c. in exchange for refreshments, to defray the charges of repairs and other necessaries, or for hard money to carry to India or China. The whole importation into

the Cape by British or foreign bottoms, from Europe, Asia, and America, in 4 years, including the value of the prize goods brought in, and of the slaves imported within the same period, amounted to 5,977,535 rix-dollars 7 sh. or 1,195,507l. 3s. 6d. currency.

When the Dutch East India company perceived their settlement extending far beyond the bounds which they had originally prescribed, they found it expedient to divide the country into districts, and to place over each a civil magistrate with the title of "Landroft," who, with his council called "Hemraaden," was authorized to settle petty disputes among the farmers, or between them and the native Hottentots, levy fines within a certain sum, collect and apply the parochial assessments, and enforce the orders and regulations of government. His district was divided into a number of subdivisions, over each of which was appointed a "Feldtwagtmeester" or country overseer, whose duty was to take cognizance of any abuses committed within his division, and report the same to the landroft, to adjust disputes about springs, or water-courses, and to forward the orders of government. The landroft, however, had only the shadow of authority. The council and the country overseers were composed of farmers, and were always more ready to screen and protect their brother boors, accused of crimes, than to assist in bringing them to justice. The poor Hottentot had, therefore, little chance of obtaining redress for the wrongs he suffered from the boors. If he espoused their cause, he became unpopular; and the distance from the capital was a sufficient obstacle to the preferring of complaints before the court of justice at the Cape, which itself had little influence in enforcing its orders in a part of the country distant 5 or 600 miles. Hence it happened that murders and the most atrocious crimes were committed with impunity; and the only punishment was a sentence of outlawry for contempt of court, when the criminal did not appear to his summons, which sentence was little regarded. This extensive settlement is divided into 4 districts; those of the Cape, of Stellenbosch and Drakenstein, of Zwellendam, and of Graaf Reynet, which see respectively.

When the Dutch government obtained, partly by purchase and partly by force, a tract of country from the Hottentots, it made grants of land to the settlers on four different tenures. The most ancient of these is that of "loan" lands; which were grants made to the original settlers of certain portions of land to be held on yearly leases, on condition of paying to government an annual rent of 24 rix dollars. Every farm was to consist of the same quantity, and to be subject to the same rent, without any regard to the quality of the land. This tenure amounted by renewals of the lease, at first made only for one year, to a leasehold in perpetuity. The number of these loan-farms in the four districts amounted in 1798 to 1832: and supposing each farm to consist only of the usual allowance, or a square of 3 miles the side, the quantity of land in all these farms would amount to 10,552,320 acres, and the annual rent they produce is about 44,000 rix dollars, or about $\frac{2}{3}$ ths of a farthing per acre. The second tenure was that of "gratuity" lands, which were originally granted in loan; but, on petition of the holders, in consequence of some supposed services done to government, they have been converted into a sort of customary copy-hold liable to a certain rent, which, like the loan lands, is continued at 24 rix-dollars a year: the number of these estates is 107. The third tenure is that of "quit-rents," arising from pieces of waste-ground, which, being contiguous or convenient to an estate, have been allowed by government to be occupied by the owners of such estates upon a lease of 15 years, on condition of their paying an annual rent of one shilling per acre. The renewal on this payment is a matter of course.

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Of such grants there are 35. The fourth tenure is that of "real estates" held in fee-simple, and subject to no rent; and they are chiefly situated in the Cape district or its vicinity. These are the choicest patches of land, and have been originally sold or granted to the early settlers in parcels of about 60 morgen, or 120 English acres.

The 22,000 christian inhabitants that compose the population of this colony may be distributed into four classes; viz. the people of the town, (See *CAPE TOWN*), wine-growers, grain-farmers, and graziers. The wine-growers, or wine-boors, occupy the best houses and the most valuable estates; and are descendants of the French families who first introduced the vine. These estates are mostly freehold, in extent about 120 English acres, and mostly employed in vineyards and garden-grounds. They bring their wine to market from September to the new vintage in March; and the deep sandy roads over the Cape isthmus require 14 or 16 oxen to draw 2 leggers of wine, whose weight is not $2\frac{1}{2}$ tons. The wine brought to market is subject to a tax of 3 rix-dollars for every legger, and the brandy, passing the barrier, pays the same sum. The wine or brandy, consumed at home, or sold in the country, is free of duty: nor are they subject to any parochial taxes or assessments, a small capitation tax excepted. These wine-farmers make their excursions in their tent-waggon drawn by six or eight horses. The corn-boors live chiefly in the Cape district and those parts of Stellenbosch and Drakenstein that are not more than two or three days' journey from the Cape; and are next in rank to the wine-boors. The grain, which they sell in the country, is subject to no tax or tithe: but a duty, about one-tenth of the value, is paid at the barrier for all grain passing towards Cape-Town. Their parochial assessments are the same as those of the wine-boor. The colonists of the Cape are very bad agriculturists, and owe their crops more to the goodness of the soil and favourable climate than to their own skill or industry. Their plough is an unwieldy machine drawn by 14 or 16 oxen, which just skims the surface and does not penetrate the stiff soil. Such grounds, when sown and harrowed, are infinitely more rough than the roughest lea-ploughing in England. They rarely give themselves the trouble of manuring, except for barley. For returns of corn they generally reckon upon fifteen-fold, in choice places from 20 to 30, and more where they have the command of water. The grain is not threshed, but trodden out in circular floors by cattle. The annual balance in favour of the farmer is about 143l. 13s. The graziers are those of Graaf-Reynet, and other distant parts of the colony. They are the least advanced in civilization. The hovels in which they reside have seldom more than two apartments, and frequently only one, in which the parents with six or eight children and the house Hottentots all sleep. Their bedding consists of skins. The walls of their hovels are formed of mud or clay baked in the sun; they are sometimes constructed with fods and poles; and frequently a sort of wattling plastered over with a mixture of earth and cow-dung, both within and without; and they are rudely covered with a thatch of reeds, seldom water-proof. As to their clothing, the men generally wear a broad-brimmed hat, a blue shirt, and leather pantaloons, no stockings, but a pair of dried skin shoes. The women have a thick quilted cap that ties with two broad flaps under the chin, and falls behind across the shoulders; a short jacket and a petticoat, no stockings, and frequently they use no shoes. The bed for the master and mistress of the family is an oblong frame of wood, supported on four feet, and reticulated with thongs of a bullock's hide, so as to support a kind of mattress made of skins sewed together, and sometimes stuffed with wool. In winter they use woollen

blankets. The bottoms of their chairs or stools are network of leather thongs. A large iron pot serves both to boil and broil their meat. They have neither linen for the table, nor knives, forks, or spoons. The boor carves with a large knife, which he carries in his pocket, for the rest of the family. Their huts and their persons are equally dirty, and their whole appearance betrays an indolence of body, and a low grovelling mind. The women are greater drudges than the men, and yet they are not very industrious. Thongs cut from skins serve, on all occasions, in lieu of ropes, and fibres cut from the tendons of wild animals are a substitute for thread. The folds or "kraals" in which they house their cattle at nights immediately front the doors of their huts; and as they are never cleaned out, they increase the filthiness of their dwellings. Few of the distant boors have more than one slave, and many of them none; but the number of Hottentots, on an average, in Graaf-Reynet, amounts to 13 to each family; and they are used with the most inexcusable inhumanity. The produce of the graziers is subject to no kind of colonial tax. They pay only a small parochial assessment proportioned to their flock; for every 100 sheep a florin, or 16d., and for every ox or cow 1d. The condition of the farmers is such, that each of them, upon a balance of his income and outgoings, saves annually 93l. 16s.

The revenues of the colony are derived from the following sources; viz. land revenue arising from rents (already explained); places for grazing cattle taken by the month, and salt-pans; duties on grain, wine, and spirits, levied at the barrier; transfer duty on sale of immoveable estates; duty arising from the sale of buildings on loan farms; public vendue duty; fees received in the secretary's office on registering the transfer of property; customs; port fees; postage of letters; seizures, fines, and penalties; licences to retail wine, beer, and spirituous liquors; interest of the capital lent out through the loan-bank; and duty arising from stamped paper. The whole amount of this revenue in 1801 was 90,142l. 13s. 4d. This revenue is applied to the payment of salaries on the civil establishment, the expences of the several departments, the repairs of government buildings, and the contingencies and extraordinary expenses of the colony; and during the government of lord Macartney, when the Cape was in the possession of this country, the revenue was more than adequate to the expenditure.

The members of the court of justice at the Cape are chosen out of the burghers of the town. The fiscal, who is the public accuser in criminal matters, and the secretary of the court, are the only persons possessed of legal knowledge. The litigious spirit of the people, encouraged by the attorneys who enter into the profession without any knowledge of the law, multiplies causes; and the expences of a single suit will sometimes amount to 400 or 500l. sterling, though the object of litigation was not worth 100l. The office of fiscal, one of the most important in the colony, consisted of the principal and a deputy, a clerk, two bailiffs, two jailors, eight constables, and 19 blacks and Malays, usually called "Kaffers." The whole expence to government was under 10,000 rix-dollars; the court of justice and secretary's office amounted to about the same sum; so that the administration of justice cost the government about 4000l. sterling a year. The court of commissaries for trying petty suits (not exceeding 40l.) and for matrimonial affairs (or granting licences) consists of a president, vice-president, and four members, whose situations are honorary and biennial. The "Weeskammer," or chamber for managing the effects of minors and orphans is one of the original institutions of the colony, and it is managed by a president

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dent and four members, a secretary and several clerks. For the support of this institution all orphan property, passing through the chamber, suffers a reduction of $7\frac{1}{2}$ per cent. upon the capital.

The established religion of the colony is Calvinism, or the reformed church. Other sects are tolerated; the Lutherans have a church; a methodist chapel has been lately built; the Moravians have a church; but the Malay Mahometans, being refused a church, perform their public service in the stone-quarries at the head of the Cape town. The clergy are suitably provided for and generally respected in this country; and they rank next to the president of the court of justice in town, and the landroft in the country. Besides their clerical duties, they have also the direction of the funds for the relief of the poor; which are raised by weekly donations at church, by legacies, and by the sums which the church demands on the emancipation of slaves. The amount of the funds belonging to the reformed church in Cape town, in 1798, were 22,168l. 8s. 8d., and the subsistence granted to the poor was 1112l. 17s. The funds of the Lutheran church were 14,829l. 13s. 2d., and the relief granted to the poor 194l. 9s. 2d.

CAPE *district*, is the smallest, but the most populous, of the four districts into which the settlement of the Cape of Good Hope is divided. It consists of two parts; one, the peninsula on which the Cape Town is situated; the other, the slip of land extending from the shore of Table bay to the mouth of the Berg river in St. Helena bay, and separated from Stellenbosch and Drakenstein, on the east, by the little Salt river, Deep river, and Mossel bank river; being about 80 miles from north to south, and 25 from east to west, and containing about 2000 square miles. The Cape peninsula is about 30 miles in length, and 8 in breadth, or 240 square miles. Of the Cape district there is not one-fifteenth part of the surface under any kind of tillage. The produce of the Cape peninsula is grapes, with all the European and many of the tropical fruits, vegetables of every description, barley for the use of horses, and a small quantity of choice wine. The other parts of the Cape district furnish wheat, barley, pulse, and wine. The population of this district in 1797 amounted to 18,152 persons, of whom 6261 were Christians, and 11,891 slaves; of the Christians or free people, 718 are persons of colour, and 1002, nearly, are Europeans. By comparing the average number of deaths with the population, it appears that the mortality in the Cape district is about $2\frac{3}{4}$ in the hundred. That of the slaves is rather greater, but less, perhaps, than in any other country, where slavery is tolerated. The number of deaths on the average of 8 years, was 350, which is after the rate of 3 in 100. The quantity of land occupied amounted in consequence of a measurement not very correct to 8018 morgen, or 16,036 acres; of which 580 morgen were employed in vineyards and gardens, and 3089 in grain. Capital crimes in this district are not so numerous as might be supposed among such a mixed multitude, the great majority of which have no interest in the public prosperity or tranquillity. As to the natural produce of this district, it is of little or no importance, if we except the fisheries. The collecting of shells for lime, and of heaths and other shrubby plants for fuel, furnish constant employment for about 1000 slaves.

It has been generally asserted, that the Cape peninsula was originally separated from the continent of Africa; and this opinion has been founded on a supposed retreat of the sea. Mr. Barrow, on the contrary, apprehends that the sea is gaining upon the land in Southern Africa; and adduces several facts in support of this hypothesis. From all the observations which he had an opportunity of making on

the southern coast of Africa he concludes, that the whole of L'Aguillas bank, stretching from Cape Point across the entrance of False bay to the mouth of Rio Infante or the great Fish river, and to the 37th parallel of southern latitude, has at one time formed a part of the continent. It has been alleged indeed in favour of the Cape isthmus having, at no long interval of time, been covered with the sea, that sea-shells have been found on the sand that is accumulated on its surface. In reply to this argument Mr. Barrow observes, that whole strata of these may be found in the sides of the Lion's hill, many hundred feet above the level of the sea; and these shells, he adds, have been conveyed to that situation not by the waves of the ocean, but by birds: and they are frequently found even on the very summit of the Table mountain.

CAPE *Town*, the capital of the colony, is situated on the south-east angle of Table bay. The settlers seem to have chosen this spot for the site of the town for the convenience of water, which rushes in a plentiful stream out of the Table mountain. Saldanhabay would, in other respects, have been more suitable; as Table bay is faulty in every point that constitutes a proper place for the mart of shipping; and so boisterous for four months in the year, as totally to prevent all ships from entering into it. The town is built with great regularity; the streets being all laid out with a line. The houses are generally white-washed, and the doors and windows painted green; they are mostly two stories in height, flat-roofed, with an ornament in the centre of the front, or a kind of pediment; with a raised platform before the door having a hut at each end. It consists of 1145 dwelling-houses, inhabited by about 5500 whites and people of colour, and 10,000 blacks. The first class is composed of those who fill the several departments of government, the clergy, the members of the court of justice, and of the police. The next are a sort of gentry who, having estates in the country, retail the produce of them by means of their slaves: subordinate to these is a number of petty dealers, who call themselves merchants; and, lastly, the tradesmen who carry on their several professions by their blacks. Many of the people of colour are fishermen. The salaries of those who are employed in the different departments of government, are so small that most of them are petty merchants. The country boors employ a sort of agents, who keep houses to lodge them when they make their annual visit to the town. These are a kind of Jew brokers, who subsist by defrauding the simple boors in the disposal of their property, and in the purchase of necessaries for them on their return. The emancipated slaves and people of colour are generally artificers; and many of them support their families by taking fish, of which there are great plenty and variety in Table bay. Upon the whole, the people of the town are an idle dissolute race of men, subsisting chiefly on the labour of their slaves, who are required to bring them a certain sum at the end of every week, and what they earn above this sum belongs to themselves; by means of which some of those who are the most industrious have been enabled to purchase their own freedom, and sometimes that of their children. The price of provisions and that of labour bear no proportion. Butchers' meat is about 2d. a pound, and good brown bread, such as the slaves eat, 1d. a pound. A common labouring slave gets from 2s. to 2s. 6d. a day, and a mechanic or artificer 5 and 6 shillings a day. The people of Cape Town are almost all of them petty dealers, and they have a remarkable propensity for public vendues. These vendues are a kind of lottery; in which a man buys in the morning a set of goods, which he again exposes for sale in the evening, sometimes gaining, and sometimes losing by his bargains.

Such

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Such is the rage for these vendues, that in four successive months of the year 1801, the amount of property sold by public auction was 1,500,000 rix-dollars, a sum equal to the whole quantity of paper money in circulation, which may be considered as the only money which has of late been circulated in the country. House rent, fuel, and clothing are dear in the Cape-town; and yet there is no city or town in Europe, where the mass of the people are better lodged or better clothed. Fire is less necessary here than in most parts of Europe. During the continuance of the south-east winds, resembling in their effect the south-east Sirocco of Naples, the town appears to be deserted. Every door and window are closed to keep out the dust and the heat, both of which decrease with the continuance of the gale; the air gradually cools, and every small pebble and particle of dust in the course of 24 hours are carried into the sea. The north-west winds of winter produce a moist and cold feeling, even in Cape-town, where, though the thermometer seldom descends below 40°, and then only about an hour before sun-rise, all the English inhabitants are glad to keep constant fires during the months of July, August, and September. Even in October it is not unusual to observe the summits of the mountain to the eastward of the Cape isthmus buried in snow. The number of marriages in Cape-town comprehending those of the whole colony, for eight years, from 1790 to 1797 inclusively, amounted to 1449; that of christenings to 2589; and that of burials to 1173: so that 1416 was the excess of christenings above burials in that period. The inhabitants of Cape-town are burthened neither with taxes nor assessments. At the first establishment of the colony a kind of capitation tax was levied under the name of "Lion and Tiger money," the produce of which was applied towards destroying beasts of prey; but since these animals have become scarce in the vicinity of the Cape, the name of the assessment is changed, but the fund supplied by it has been appropriated to the repairs of the roads, streets, water-courses, and other public works. Its ordinary amount is about 5000 rix-dollars a year. Another assessment, chargeable on heads of families at the rate of 1s. 6d. a month, for every house or fire-place, is called "Chimney and hearth money," and amounts to about 5200 rix-dollars yearly. The inhabitants of Cape-town are subject to no tithes nor church-rates; but as the church provides for the poor, every person manumitting a slave pays to it 10l. giving security that such slave shall not become burdensome for a certain number of years. The police of the town is committed to the management of a board, consisting of six burghers, called the "Burgher Senate." The pleasures of the inhabitants are chiefly of the grosser kind, being those of eating, drinking, and smoking: they have no taste for public amusements, and no exercise but that of dancing. In the whole town there is neither a bookseller's shop, nor a book society. Under the direction of the church is a library, left by an individual, and consisting of many excellent books; but very little used. Books are rarely found in Cape-town to constitute any part of the furniture of a house. Education is so little regarded, that neither government nor the church has been able to raise a sufficient sum for establishing a proper public school in the colony; and few of the natives are in circumstances that allow of their sending their children for education to Europe.

One of the greatest nuisances in Cape-town is the number of dogs that prowl about the streets, particularly by night, when they quit their dens and lurking places in quest of the offals of butchers' shops. Sometimes the wolves and hyenas descend from their dens in the Table mountain, and dispute the spoil with the dogs: at such times the town re-

sounds with their hideous howlings through the whole night. Soon after the Dutch East India company formed a settlement at the Cape, they found it necessary to build a fort for the protection of their own property and that of other settlers, and also of their warehouses against the attempts of the natives. As their trade increased, and the Cape became more frequented, it was deemed expedient to extend the works, and to erect a citadel that should serve as a defence against any attack, either by land or by sea. This citadel is the present castle, a regular pentagon fort, with two ravelins and some other outworks, and surrounded by a wet ditch: but it is so injudiciously situated, that though it commands the town and part of the anchorage, it is itself commanded by the ground rising from it in a slope to the Devil's hill, which therefore renders it indefensible. This slope is now occupied as high as the commencement of the perpendicular rocky side of the Devil's hill, by various redoubts, batteries, and block-houses, commanding each other, and the advance ground to the castle, all of which were added by sir James Craig, when the Cape was in the possession of England. He also made some other important additions to the fortifications of this place. Fort Knokke is connected with the citadel by a rampart drawn along the shore, called the "sea lines," defended by several batteries, mounted with heavy guns, and furnished with ovens for heating shot. Within these lines is a powder magazine and a long range of low buildings that were converted under the English government into a general hospital, with lodgings for the inspector, store-keeper, and apothecary to the forces. On the west of the bay are three strong batteries, viz. the Rogge-bay battery, the Amsterdam battery, and the Chavonne battery, all the guns of which bear directly upon the anchorage. There is also a small battery, called the "Mouille," commanding the entrance of the bay. A little farther, on a small sandy cove, a work is thrown up with a few light guns and a heating furnace, for preventing a landing at this place, which is further impeded by three anchors fixed across the inlet. At Camp's bay, on the western coast of the peninsula, there are also a few small batteries, and a military post on the height above it, directly between the Table mountain and the Lion's head. An army landing here, and at Three Anchor Bay, might take the town and all the batteries in their rear, or, by a more important movement, might get possession of the Lion's rump, from whence, with a few howitzers, the town and citadel, and the strong batteries on the west side of Table bay, would be completely commanded. This hill has the very great advantage of not being commanded by any other point. Sir James Craig proposed to erect a citadel on this eminence with suitable appendages and accommodations, if the Cape had remained in our possession, which would, in his opinion, be ably defended in time of war by 1200 men; and would render the town, the batteries, and the castle, untenable by an enemy, all of which might be totally destroyed from this height in 24 hours.

Besides the castle and the forts, the other public buildings of Cape town are a large well constructed barracks for 2000 men; a quadrangular building with an area in the centre, where the government slaves are lodged to the number of nearly 400; the reformed church, which is a spacious and neat structure; the Lutheran church; the town-house; the court of justice; and a theatre. The Cape of Good Hope is situated in S. lat. 34° 29'. E. long. 18° 23' 15". The town is in S. lat. 33° 55' 42". E. long. 18° 23' 15". Barrow's Travels into the interior of Southern Africa, &c. vol. i. and ii.

CAPE Verd and Islands. See VERD.

CAPE,

CAPE, in *Law*, a writ judicial, touching plea of lands and tenements; so termed, from the word which carries the chief intention or end of it.

Cape is of two kinds, the *magnum* and *parvum*; which in their effect are alike, as to the taking hold of things immoveable; though in certain circumstances they differ: 1. In that the *cape magnum*, or *grand cape*, lies before; and the *cape parvum*, or *petit cape*, after appearance. 2. *Cape magnum* summons the defendant to answer the default; and also over to the demandant: *cape parvum* only to the default. It is called *petit cape*, not because of its small force; but because contained in few words.

CAPE magnum is thus defined in the old Nat. Brev. 162. "Where a man hath brought a *precipe quod reddat* of a thing that touches plea of land, and the tenant makes default of the day to him given in the original writ; then this writ shall be for the king to take the land into his hands: and if the tenant come not at the day given him by the writ, he loses his land."

CAPE parvum, or *petit cape*, is thus defined, *ibid.* "Where the tenant is summoned in plea of land, and comes at the summons, and his appearance is recorded; and at the day given him, prays the view; and having it granted, makes default; then shall this writ issue for the king, &c." Reg. Jud. fol. 1. 2. Bract. l. 3. tract. 3. c. i. Fleta. l. 2. c. 44.

CAPE ad valentiam, a species of *cape magnum*, so called from the end to which it tends: it is thus described, "Where I am impleaded of lands, and I vouch to warrant another, against whom the summons *ad warrantandum* hath been awarded, and he comes not at the day given; then, if the demandant recover against me, I shall have a writ against the vouchee; and shall recover so much in value of the lands of the vouchee, if he has so much: otherwise, I shall have execution of such lands and tenements as descend to him in fee; or, if he purchase afterwards, I shall have a re-summons against him; and if he can say nothing, I shall recover the value." Old. Nat. Brev. 161.

CAPE du Batardeau, in *Fortification*, the cap, upper part, or roof of the batardeau constructed on the ditch of a work at the salient angle of the bastion. There is commonly raised or erected on the middle of it a small tower or turret, six or seven feet, to prevent desertion.

CAPECE, **SCRIPTO**, in *Biography*, an eminent Latin poet of Italy, was born of a noble family at Naples towards the beginning of the 16th century, and began his career as professor of jurisprudence in the university of his native city, but afterwards directed his attention to polite literature. His house was the resort of learned men, who produced in 1535 "Commentaries on Virgil," attributed to Donatus. He first attracted notice as a poet by three books in praise of St. John the Baptist, entitled "De Vate maximo." But his fame was chiefly owing to his poem in two books, "De Principiis Rerum," first printed in 1542, and dedicated to pope Paul III.; in consequence of which, Bembo and Manuzio did not scruple to compare him, though without sufficient reason, with Lucretius. This poem, with a translation and learned notes of the abbé Ricci, was reprinted, together with the other poems of Capece, who appears to have been living in 1561, at Venice, in 1754. Gen. Dict. Triaboschi.

CAPEDUNCULA, in *Roman Antiquity*, the vessels wherein the sacred fire of Vesta was preserved. See **VESTALS**.

CAPEL, in *Geography*, a town of Germany in the duchy of Carinthia, on the Fella; 10 miles S. of Volkemarck.

CAPELAN, in *Ichthyology*, a name given by writers to

a kind of whiting called by the Venetians *matlo*, and by obsolete authors *afellus omnium minimus*, and *merlangus*. This is most probably *gadus minutus* of the moderns, which Belon calls *merlangus*, and is the smallest of its tribe. The *merlangus* of Gesner is certainly too large for the capelan, and appears to be the same with our common whiting, *GADUS MERLANGUS*.

CAPELINE, in *Military Language*, a sort of iron head-piece, or helmet, which the cavalry under John, duke of Bretagne, used to wear.

CAPELINE, in *Surgery*, a kind of bandage used by the French surgeons in cases of amputations; consisting of a roller with two equal heads.

CAPELL, **EDWARD**, in *Biography*, one of the numerous editors and commentators of Shakespeare, was born in the county of Suffolk, and died in 1781. His edition of Shakespeare, in 1768, was comprised in 10 volumes, small 8vo. with an "Introduction" of singular composition, announcing another work, which was published in 1783, under the title of "Notes and various readings of Shakespeare; together with the school of Shakespeare, or Extracts from divers English books, that were in print in the author's time, evidently shewing from whence his several fables were taken, &c. &c." Mr. Capell was the editor of a volume of ancient poems, called "Prolusions;" and the alteration of "Antony and Cleopatra," as acted at Drury-lane in 1758. See **SHAKESPEARE**.

CAPELL, in *Geography*, a town of Germany, in the duchy of Stiria; 3 miles N. of Muertznschlag.

CAPELLA, in *Astronomy*, a bright star of the first magnitude, in the left or preceding shoulder of the constellation **AURIGA**.

CAPELLA, **MATIANUS MINEUS FELIX**, in *Biography*, an African Latin writer, who flourished about the year 470, and is supposed to have resided at Rome. He is author of a work in nine books, which consists of prose and verse intermixed, upon the seven liberal arts. The title of his work is "De Nuptiis Philologię et Mercurii."

Of all his nine books, no one has been much noticed by the moderns, except the ninth, which treats of music. The few Romans who expressly treated that subject, and the eager desire of classical readers to obtain some knowledge of the means by which the ancients produced, by the power of modulated sounds, those miraculous effects which are recorded, not only by poets, but historians and philosophers, drew particular attention on this part of the work.

The author's plan is the following.

Personifying Philology and Harmony, or Poetry and Music, under the character of Mercury and Harmonia, he describes their union as a nuptial feast, at which Jupiter and all the heavenly host of Paganism attend; celebrates as terrestrial cultivators of music, Orpheus, Amphion, and Arion, who are admitted among the celestials to partake of the entertainment. And after going over the old ground in relating the wonders which music has performed, in healing diseases, quelling seditions, tempering and bringing to reason the irregular affections of unruly youth, Harmonia is desired by Apollo and Minerva to unfold the mystery of her art.

We shall not enter on a disquisition concerning the Latinity of this work, which by many critics has been termed barbarous, but confine our reflections to the information which inquirers into the arcana of ancient music are likely to derive from its perusal.

The author explains, by the mouth of Harmonia herself, the Greek scale of tones and semitones, giving Latin translations of the Greek musical terms, proceeding from *Proslambanomenos*, the lowest sound in the general system, and mounting

ing up to *Hyperboleon, ultima excellentiam*. The next period treats of consonances; then of modes; of single sounds; harmonical parts of the system; of intervals, genera, keys, tetrachords; of the diapente and diatessaron, or 5th and 4th; of transpositions; of melopœia, rhythm, three kinds—the dactylic, iambic, and pæonian; and of six kinds of compound rhythm.

This ninth book, according to Meibomius, may be regarded as divided into two parts; the first containing the history of music, and its eulogium, the second the theory and precepts of the art itself; and this last is what we shall chiefly consider, as to its utility. And in mercy to inquirers after Greek music, or the music of the ancients in general, we can assure them, that what has been so long fought in vain among the seven Greek theorists published by Meibomius, in Ptolemy, Plutarch, and Boethius, will not be found in Martianus Capella. His definitions are awkward Latin translations of what may be found not only in Aristides Quintilianus, but in every Greek writer on music. He has not given us one of the characters of either Greek or Roman notation; nor is there, either in his encomia or definitions, a word that encourages a belief that the ancients knew any thing of simultaneous harmony, or *music in parts*; or even a trait of the arrangement of single notes, to enable us to form any judgment of their melody. The rhythms, of which so many are mentioned, are those of verse, which probably were likewise those of music.

He was the first from whom we received equivalents in Latin for the Greek musical technica, and we find in his poetry many new metres, which we do not recollect to have seen in any other Roman poet. The learned work of Capella was first published by Vitalis, in folio, at Venice, in 1499, in a very incorrect state. The corrections of Hugo Grotius at the age of 14 are among the wonders of literary history. They were published at Leyden in 1599.

Another CAPELLA, who was a writer of elegy, is commemorated by Ovid, "De Ponto."

CAPELLE, in *Geography*, a town of France, in the department of the Straits of Calais, and district of Montreuil; 1 league S. of Hesdin.

CAPELLE, LA, a town of France, in the department of Aisne, and chief place of a canton in the district of Vervins; 4 leagues N.E. of Guise. The town contains 1,077, and the canton 14,097 inhabitants; the territory includes 187½ kilometres and 18 communes.

CAPELLE-MARIVAL, LA, a town of France, in the department of the Lot, and chief place of a canton in the district of Figeac; 8 miles N.N.W. of Figeac. The place contains 1,013, and the canton 12,122 inhabitants: the territory comprehends 215 kilometres and 20 communes.

CAPELLEN, a town of Germany, in the duchy of Stiria; 8 miles W. of Luttenburg.

CAPELLETTI, a Venetian militia, composed of soldiers that partly were slaves, Dalmatians, Albanians, and Morlachians, and were regarded as the choicest and best troops of the state of Venice. They were much confided in by the Venetians, and were employed to guard their places of the greatest importance, and amongst others the palace and place of St. Mark at Venice.

CAPELLUTIUS, RELAND, in *Biography*, a distinguished physician and philosopher, who flourished in the latter part of the 15th century, under the pontificate of Paul II. published in 1490, "Chirurgia," printed at Venice in fol. and reprinted with additions in 1519 and 1546. It contains the whole body of surgery, collected principally from Albucasis, and other Arabian writers. A posthumous work of this writer was published at Franckfort in 1642, 8vo.

reprinted in 1648, 4to. and again in 1682, 8vo.; "De Curatione Pestiferorum Apostematum;" a practical work, much esteemed. Haller. Bib. Chir. Eloy Dict. Hist.

CAPENA, or *Capinna*, Steph. Byz. in *Ancient Geography*, a town of Italy in Etruria, between the country of the Veii and the Tiber, according to Livy, who places the wood and temple of Feronia within its territory. Virgil also mentions this city, which was nearly N. of Rome.

CAPENA was also the name of one of the gates of Rome, now the gate of St. Sebastian, S.E. of Rome.

CAPENSIS, in *Conchology*, a species of ANOMIA. The shell is longitudinally striated, slightly truncated, with roundish crenated margin; flat valve, with a two-spined rib beneath. Chemn. Inhabits the Cape of Good Hope. Shell sometimes reddish, sometimes white.

CAPENSIS, in *Entomology*, a species of BOMBYLIUS, that inhabits Africa, the wings of which are spotted with black; body greyish and black at the extremity. Linn.

CAPENSIS, a species of PHALÆNA, (Bombyx) that inhabits Africa. The wings are pale red; on the anterior pair two flexuous streaks, the posterior of which is connected to a black one.

CAPENSIS, a Linnæan species of CICINDELA. This kind is somewhat brassy, with white wing-cases marked with a three-branched fuscous line. Inhabits the Cape of Good Hope, and Calabria.

CAPENSIS, a species of CERAMBYX, found at the Cape of Good Hope. The general colour is black; thorax two-spined; four rufous bands on the wing-cases; antennæ moderate.

CAPENSIS, a species of CARABUS, described by Thunberg as a native of the Cape of Good Hope. This is of a ferruginous colour, with a black longitudinal line on the thorax and suture of the wing-cases.

Obs. The abdomen in some specimens is black; in others brown.

CAPENSIS, in *Ornithology*, a species of ALAUDA, that inhabits the Cape of Good Hope. The three lateral feathers of the tail are tipped with white; chin pale yellow, edged with black; eye-brows yellow: *Cape lark*, Latham; *alauda capitis bonæ spei*, Brisson; and *cravate jaune ou calandre du cap de bonne espérance*, Buffon. The bill is yellowish brown; upper part of the body with the tail brown; all the feathers darkest in the middle; chin orange; body beneath ochraceous; legs black; back claw rather hooked.

CAPENSIS, a species of ANAS, of a greyish colour, with chestnut-coloured back, and speculum spot on the wing pale greenish blue, edged with white.

This is the *cape wigeon* of Latham. The length is fifteen inches; bill red, black at the base; head spotted; legs reddish; claws black. Inhabits the Cape of Good Hope.

CAPENSIS, a species of ALCEDO. This has the tail long, and of a cinereous blue colour; beneath fulvous; breast testaceous; bill red. Gmel.

This bird inhabits the Cape of Good Hope. Its length is fourteen inches. The bill is blackish at the tip; head grey, inclining to tawny; body above blue green, inclining to ash on the back; legs and claws red. Brisson calls it *ispida capitis bonæ spei*; and Buffon, *martin-pecheur du cap de bonne espérance*.

CAPENSIS, a species of CETHIA, that inhabits the Cape of Good Hope. The colour is fuscous; tail-feathers blackish, the exterior ones fringed at the outer edges with white. Brisson, &c.

CAPER-bean, in *Botany*. See ZYGOPHYLLUM.

CAPER-bush. See CAPPARIS.

CAPER, or CAPRUS, in *Ancient Geography*, a river of Asia,

c. 9. Before this last statute a practice had been introduced of commencing the suit by bringing an original writ of trespass, "*quare clausum fregit*," for breaking the plaintiff's close, "*vi et armis*;" which by the old common law subjected the defendant's person to be arrested by writ of "*capias*;" and then afterwards, by connivance of the court, the plaintiff might proceed to prosecute for any other less forcible injury. This practice (through custom rather than necessity, and for saving some trouble and expence, in suing out a special original, adapted to the particular injury) still continues in almost all cases, except in actions of debt; though now, by virtue of the statute above cited, and others, a "*capias*" might be had upon almost every species of complaint. It is now usual in practice, to sue out the "*capias*" in the first instance, upon a supposed return of the sheriff (that the defendant, being summoned or attached, made default, or that he had no substance by which to be attached); especially if it be suspected that the defendant, upon notice of the action, will abscond; and afterwards a fictitious original is drawn up, if the party is called upon so to do, with a proper return thereupon, in order to give the proceedings a colour of regularity. When this "*capias*" is delivered to the sheriff, he by his under-sheriff grants a warrant to his inferior officers, or bailiffs, to execute it upon the defendant. If the sheriff of the county, in which the injury is supposed to be committed, and the action is laid, cannot find the defendant in his jurisdiction, he returns "*non est inventus*;" whereupon another writ issues, called a "*testatum capias*," directed to the sheriff of the county where the defendant is supposed to reside, reciting the former writ, and that it is testified "*testatum est*," that the defendant lurks or wanders in his bailiwick, wherefore he is commanded to take him, as in the former "*capias*." But in a case of this kind also, it is usual, for saving trouble, time, and expence, to make out a "*testatum capias*" at the first; supposing not only an original, but also a former "*capias*" to have been granted. This fiction, being beneficial to all parties, is readily acquiesced in, and is now become the settled practice. But where a defendant absconds, and the plaintiff would proceed to an outlawry against him, an original writ must then be sued out regularly, and after that a "*capias*." And if the sheriff cannot find the defendant upon the first writ of "*capias*," and returns "*non est inventus*," there issues out an "*alias*" writ, and after that a "*pluries*," to the same effect as the former; only after these words, "*we command you*," this clause is inserted, "*as we have formerly*," or "*as we have often commanded you*;" "*sicut alias, or sicut pluries, præcipimus*." In the King's-bench, the bill of Middlesex is a kind of "*capias*." See *Bill of Middlesex*.

A "*capias*" is also used in criminal, as well as in civil, cases. The proper process on an indictment for any petty misdemeanor, or on a penal statute, is a writ of "*venire facias*," which is in the nature of a summons to cause the party to appear. If by the return to such "*venire*" it appears, that the party hath lands in the county, whereby he may be distrained, then a "*distrains infinite*" shall be issued from time to time till he appears. But if the sheriff returns that he hath no lands in his bailiwick, then (after his non-appearance) a writ of "*capias*" shall issue, which commands the sheriff to take his body, and have him at the next assizes; and if he cannot be taken upon the first "*capias*" a second and a third shall issue, called an "*alias*," and a "*pluries capias*." But on indictments for treason or felony, a "*capias*" is the first process; and, for treason or homicide, only one shall be allowed to issue, or two in the case of other felonies, by stat. 25 Edw. III. c. 14.; though the usage is to

issue only one in any felony; the provisions of this statute being in most cases found impracticable. Also, in the case of misdemeanors, it is now the usual practice for any judge of the court of King's-bench, upon certificate of an indictment found, to award a writ of "*capias*" immediately, in order to bring in the defendant. But in this, and also in civil cases, if he absconds, and it is thought proper to pursue him to outlawry, greater exactness is necessary. Blackit. Com. v. iii. 282, &c. v. iv. p. 318, &c.

CAPIAS ad satisfaciendum, commonly termed *CA. SA.*, is a writ of execution after judgment; lying where a man recovers in an action personal, as for debt, damage, &c. in which cases, this writ issues to the sheriff, commanding him to take the body of him against whom the debt is recovered; who is to be kept in prison till he make satisfaction.

It is usual to take out this writ, where the defendant hath no lands nor goods, whereof the debt recovered may be levied: and when the body is taken upon a *Ca. Sa.* and the writ is returned and filed, it is an absolute and perfect execution against the defendant, and no other execution can be had against his lands and goods. But this is unless the defendant escape, or die in execution, &c. for where a person dies in execution, his lands and goods are liable to satisfy judgment, by stat. 21 Jac. I. c. 24. Rol. Abr. 904. This writ does not lie against any privileged persons, peers, or members of parliament; nor against executors or administrators (except on a "*devastavit*" returned by the sheriff, 1 Lill. 250); nor against such other persons as could not originally be held to bail. It may be sued out for costs, against a plaintiff as well as a defendant, when judgment is had against him. If the defendant cannot be taken upon a *Ca. Sa.* in the county where the action is laid, there may issue a "*testatum Ca. Sa.*" into another county, and so of the other writs.

CAPIAS pro fine. When judgment is given for the plaintiff, it is considered that the defendant be either amerced, for his wilful delay of justice in not immediately obeying the king's writ by rendering the plaintiff his due; or be taken up, "*capiatur*" till he pays a fine to the king for the public misdemeanor which is coupled with the private injury, in all cases of force, of falsehood in denying his own deed, or unjustly claiming property in replevin, or of contempt by disobeying the command of the king's writ or the express prohibition of any statute. But now in case of trespass, ejectment, assault, and false imprisonment, it is provided by 5 & 6 W. & M. c. 12., that no writ of "*capias*" shall issue for this fine, nor any fine be paid; but the plaintiff shall pay 6s. 8d. to the proper officer, and be allowed it against the defendant among his other costs. And, therefore, upon such judgments in the Common Pleas they used to enter that the same was remitted; and now in both courts they take no notice of any fine or "*capias*" at all. Blackit. tom. v. iii. p. 398.

CAPIAS ulagatum, a writ which lies against one outlawed upon any action, personal or criminal; by which the sheriff is ordered to apprehend the party outlawed, for not appearing on the exigent, and keep him in safe custody till the day of return; when he is to present him to the court, to be there further dealt with for his contempt: who, in the Common Pleas was formerly to be committed to the Fleet, and to remain there till he had sued out the king's pardon, and appeared to the action. By a special "*Capias ulagatum*" (against the body, lands, and goods in the same writ) the sheriff is commanded to seize all the defendant's lands, goods, and chattels, for the contempt to the king; and the plaintiff, (after an inquisition taken thereupon, and returned into the exchequer) may have the lands extended, and a grant of the goods, &c. whereby to compel the defendant to appear; which when he doth, if he

reverse

reverse the outlawry, the same shall be restored to him. Old. Nat. Brev. 154. When a person is taken upon a "capias utlagatum," the sheriff is to take an attorney's engagement to appear for him, where special bail is not required; and his bond with sureties to appear, where it is required. Stat. 4. & 5. W. & M. c. 18. See OUTLAWRY.

CAPIAS in *Wüthernam*. See WÜTHERNAM.

CAPIAS *conductos ad proficiscendum*, an original writ, which lies, by the common law, against any soldier who has covenanted to serve the king in war, and appears not at the time and place appointed. It is directed to two of the king's serjeants at arms, to arrest and take him wherever he may be found: and to bring him *coram concilio nostro*, with a clause of assistance.

CAPIATUR, *judgment quod*. See CAPIAS *pro fine*.

CAPIBARA. See CAPYBARA.

CAPICULY, formerly called Janizaries, the first and best corps or body of the Turkish infantry.

CAPIDAVA, in *Ancient Geography*, a town of Lower Mæsia, between Axiothis and Carion. Antonin. Itin.

CAPIDODIUS, in *Zoology*, a name given by Paulus Jovius, and some other obsolete writers, to an animal of the cetaceous tribe (or fish as they describe it) distinguished by having the snout bending upwards, and armed with broad serrated teeth. The species implied is certainly DELPHINUS ORCA of Linnæus and later authors.

CAPIDOLIA, in *Zoology*, a synonym of BALÆNA MUSCULUS.

CAPIGI, or CAPIDGI, a porter, or door-keeper of the Turkish Seraglio. There are about five hundred capigis, or porters, in the Seraglio, divided into two companies; one consisting of three hundred, under a chief called *Capigi-Bassa*, who has a stipend of three ducats per day; the other consists of two hundred, distinguished by the name of *Cuccicapigi*, and their chief *Cuccicapigi-Bassa*, who has two ducats. The capigis have from seven to fifteen aspers per day; some more, others less. Their business is to assist the janizaries in the guard of the first and second gates of the Seraglio; sometimes all together; as when the Turk holds a general council, receives an ambassador, or goes to the mosque; and sometimes only in part; being ranged on either side to prevent people entering with arms, any tumults being made, &c. The word, in its original, signifies *gate*.

CAPIGIS-bachis, or CAPIDGIS-bachis, a sort of chamberlains belonging to the grand signior whose place is honourable and lucrative, and who are charged to execute the orders which they receive from the sultan, e. g. to cut off the head of a rebel or extortioner, to carry the news of the appointment to a government, to go and collect the successions of the great officers of the empire, &c.; their chief, always taken from this class, is called "Mir-alem." The capidgis-bachis are sometimes raised to the dignity of pacha or bashaw with two tails, and go in that quality to govern the province which is allotted to them.

CAPILLAIRE, a syrup made of maiden-hair. See ADIANTUM and ASPLENIUM.

CAPILLAMENT, literally signifies *hair*, being formed of the Latin *capillus*, of *caput*, q. d. *hair of the head*. Hence the word is figuratively applied to several things, which, on account of their length, or their fineness, resemble hairs: as,

CAPILLAMENTS of the nerves, the fine fibres, or filaments, whereof the nerves are composed.

CAPILLAMENT, in *Botany*, a term used by the old botanists for the filament of the stamen. Bradley seems to re-

strain *capillaments* to the smaller flowers; and *stamina* (which he corruptly calls *apices*) to the larger.

CAPILLAMENT is also applied to the strings or threads about the roots of plants.

CAPILLARÆS, a name given by some of the old botanists to the ferns, because, according to Mr. Ray, they strengthen and improve the human hair; or, according to others, from a curious fancy that they grow from the earth without stems, in the same manner as hairs grow from the human head.

CAPILLARIS, or CAPILLATA, *Arbor*, an ancient tree at Rome, on which the vestal virgins, when shaven for their office, hung up their hair, and consecrated it to the gods.

CAPILLARY, of the Latin *capillus*, a *hair*, is applied to several things, to intimate their exceeding smallness or fineness, resembling that of a hair.

CAPILLARY is also used by *Mineralists* in speaking of ores which ramify or shoot out fine branches like threads.

In which sense it amounts to the same with what is otherwise called *arborescent* and *striated*. Woodward speaks of capillary or arborescent silver and iron; Grew describes a piece of pure capillary copper from the mine of Heragrunst, the several striæ or capilli of which are short, of a reddish golden colour, growing together almost like those of the little stone-moss.

CAPILLARY roots. See FIBROSE roots.

CAPILLARY tubes, in *Physics*, are those which are very small, or whose canals are so narrow, as by the diminutive size of their bores to resemble a hair in diameter. The usual diameter of capillary tubes is a half, third, or fourth of a line, or from $\frac{1}{16}$ th to $\frac{1}{32}$ th of an inch: though Dr. Hook assures us he drew tubes in the flame of a lamp much smaller, and almost as fine as the thread of a cobweb.

The ascent of fluids in tubes of this kind is a phenomenon which has been noticed by philosophers, and of which different accounts have been given. The fact is unquestionable; for if one end of a small tube, open at both ends, be immersed in water, the liquor within the tube will rise to a sensible height above the external surface; or if two or more tubes be immersed in the same fluid, e. g. water, one of them a capillary one, and the other considerably larger, the water will rise perceptibly much higher in the former than in the latter; in the reciprocal ratio of the diameters of the tubes: and the effect is the same in vacuo as in the open air.

The greatest height to which Dr. Hook ever found water to ascend above the level of the basin, in his very small capillary tubes, did not exceed 21 inches. See ASCENT of fluids.

For the illustration of this phenomenon, we may observe in general, that the particles of water and of other fluids mutually attract each other; and that there is also an attraction between glass and water, &c. which is increased by cold, and diminished by heat, but which is, *ceteris paribus*, proportional to the surface of contact. The mutual attraction of particles of water is evinced by the globular forms of the drops of this fluid, by their coalescing when brought near one another, and by a variety of other phenomena. It is observed also, that if we breathe on a glass plate, the breath will adhere to it longer in cold, than in hot weather. If a drop of water be laid upon glass, the surface most remote from the glass will retain a convex form, whilst that which touches it will adapt itself to the surface of the glass, and adhere to it with a certain degree of force; but if the same drop be spread over the surface of the glass, it will lose its convex surface, and adhere to the glass with a greater force.

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By this dispersion of its particles they will be removed farther from each other, and their mutual attraction will be diminished; whereas, on the other hand, the attraction between the water and the glass is increased by enlarging the surface of contact. In either of these cases, the water is attracted by the glass only on one side; but if another piece of glass be placed in opposition to the former, and in contact with the film of water, the water will be attracted and retained with a greater force; and if the water be on every side encompassed with glass, or enclosed in a narrow tube, the attraction will become stronger, because the surface of contact in proportion to the quantity of water is thus considerably enlarged. The truth of these observations may be evinced in the following manner. Put water into a glass vessel, (*Plate I. Hydrostatics, fig. 1.*) and the water near the surface of the glass will ascend, and form a curve, as at A and B; or the same effect will be exhibited at C and D, by dipping part of a piece of glass in the water. In order to explain this effect, let A B, (*fig. 2.*) represent a section of the surface of a piece of glass, the lower part of which is immersed in the water, B C: and suppose this surface to be divided into a number of indefinitely small parts, *a, b, c, d, &c.*; then the part *a*, next to the surface of the water, B C, will raise a quantity of water proportional to its attractive force; which quantity is thus brought nearer to the part *b* of the glass, and attracted by it, so that another quantity of water takes its place next to *a*. The first quantity of water being raised to *b*, is brought nearer to the part *c* of the glass, and being attracted by it, is raised to the place *c*, whilst the first quantity of water *a*, takes its place, which is succeeded by another quantity of water which rises to the place *a*; so of the others. In consequence of this attraction, the water ought to form a film of equal thickness, or the quadrilateral figure, *g, h, a, s*, on the whole surface of the glass. But by reason of the mutual attraction of the particles of water towards each other, when the first quantity of water has been raised to the place *a*, another quantity of water *s*, is kept suspended by this latter attraction, between the water at *a*, and that at B C. When the glass has by its attraction raised the water to *b*, the part *s* will be extended to *tz*, because the two quantities of water, *a* and *b*, can keep suspended a greater portion of water than the single part *a*. Thus, the water will ascend along the surface of the glass, and will remain adhering to it, in such quantity as to form a counterpoise to the attraction of the glass; or, in other words, the pressure of the water thus raised, and the attraction between it and the water, B C, will form by their united actions a counterpoise to the attraction of the glass. The real ascent of the water, which, in the figure we have referred to, has been enlarged for the better illustration of the subject, seldom exceeds $\frac{1}{8}$ th of an inch, when the glass is either flat, or not much bent. But this altitude is increased by a variety of circumstances; viz. by the temperature and purity of the water, by the quality of the glass, and chiefly by the polish and cleanliness of its surface.

In small tubes of different diameters, the perpendicular ascent of water, and of various other fluids, will be inversely as their respective diameters. Thus, if glass tubes opened at both ends be immersed with their lower apertures in water, (see *fig. 3.*) the water will instantly rise spontaneously into their cavities; and it has been found to rise higher and with a greater velocity in narrower than in large tubes, according to the proportion in which the diameters of the larger tubes exceed those of the smaller, and the altitude in a tube of $\frac{1}{80}$ th part of an inch, (viz. 0.01), in diameter, will be

about 5.3 inches. Consequently, in a tube of 0.02 in diameter, the altitude of the water will be the half of 5.3, viz. 2.65 inches. Also, in a tube whose diameter is 0.1 of an inch, or 10 times 0.01, the altitude of the water will be the 10th part of 5.3, or 0.53 of an inch, &c. Hence it follows, that if we call the diameters of the tubes D, *d*, and the altitudes of the water A, *a*, we shall have, $D : d :: a : A$, and $AD = ad$; that is, the product of the diameter by the altitude of the water is always the same, or the constant quantity 0.053 of an inch; for when the diameter is 0.01 of an inch, the water rises to the altitude of 5.3 inches; and 5.3×0.01 is equal to $0.053 = 0.02 \times 2.65 = 0.1 \times 0.53$. If, therefore, you wish to know how high the water will rise in a tube of a given diameter, it is only necessary to divide 0.053 by the diameter, and the quotient expresses the altitude in inches, very nearly; for allowance must be made for difference of temperature, the nature and cleanliness of the glass, &c. which influence the altitude. Moreover, since the surface of a cylinder is as the product of the diameter multiplied by the axis, or the altitude, and it has been already shown, that in the part of the tube occupied by the water, the product of the diameter by the altitude is a constant quantity, the surface of the glass which is in contact with such a pillar of water, is likewise a constant quantity.

Mr. Atwood, in his "Analysis," has given the following method of very accurately determining the diameter of a capillary tube. Put into the tube some mercury, whose weight in grains is *w*, and let it occupy a length of the tube *l*; then, if 13.6 be the specific gravity of mercury, as it is when in its purest state, that of water being 1, the diameter will be $= \sqrt{\frac{w}{l}} \times .01923$. For let *d* be the diameter,

and the contents of the mercury will be $= d^2 l \times .7854$; and as one cubic inch of mercury weighs 3443 grains, we have $1 : 3443 :: d^2 l \times .7854 : w$; hence we shall have $d^2 l \times .7854 \times 3443 = w$, and $d^2 = \frac{w}{l} \div .7854 \times 3443$

$$= \frac{w}{l} \div 2704.1322; \text{ and } d = \sqrt{\frac{w}{l} \div 2704.1322} = \sqrt{\frac{w}{l}} \times \frac{1}{\sqrt{2704.1322}} = \sqrt{\frac{w}{l}} \times .01923.$$

Several ingenious persons, who, in examining the phenomena of capillary attraction, have found that the bulks of the suspended pillars of water are not proportional to the surfaces of glass with which they are in contact, have been embarrassed in explaining them; and for this purpose they have adopted various hypotheses. Some have supposed that the unequal pressure of the air upon the liquor contained in the tube and that in the vessel is the cause of the ascent in the tube. In order to account for this inequality, some have had recourse to the magnitude of the particles of the air and of the ascending fluid; others have conceived, that only an inverted cone of air, touching the surface of the liquor in the tube with its vertex, and having the upper orifice of its tube for its base, could press upon the surface contiguous to its vertex. Dr. Hook supposed that part of the pressure of the air in the tube was taken off by its friction, which he apprehends must necessarily happen against the sides in so narrow a passage; and this hypothesis of Dr. Hook was for a long time very generally received. Those who wish to see his explication of it may find it in the sixth Observation of his "Micrography," or in Cotes's Hydrostatic and Pneumatical lectures, (*ubi infra.*) But since it

has

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has been observed, that the same ascent of liquors in capillary tubes occurs in vacuo as in the open air; this hypothesis of an inequality of pressure has been relinquished; and the solution of the difficulty has been sought for in the mutual attraction of the particles of fluids and those of glass. Mr. Hawksbee, and others, have recourse to the attraction of the annuli of the concave surface of the tube. Dr. Jurin (Phil. Trans. N^o 355, and N^o 363, or Abr. vol. iv. p. 423, &c.) ascribed the suspension of the water to the attraction of the small annular portion, or periphery of the inside of the tube, to which the upper surface of the water is contiguous and adheres; this being the only part of the tube, from which the water must recede upon its subsiding, and consequently, the only one which, by the force of its cohesion and attraction, counteracts the gravity of the water, and opposes its descent. This he shews to be a cause proportional to the effect; because the periphery, and the suspended column, are both in the same proportion as the diameter of the tube. The suspension being thus accounted for, the seemingly spontaneous ascent will be easily solved: for since the water that enters the capillary tube, as soon as its orifice is dipped in it, has its gravity taken off by the attraction of the periphery, with which its upper surface is in contact, it must necessarily rise higher; partly by the pressure of the stagnant water, and partly by the attraction of the periphery, immediately above that which is already contiguous to it. Dr. Hamilton, (Lect. ii. p. 47, &c.) dissatisfied with the principle adopted by Dr. Jurin and others, supposes that the pillar of water is supported by the attraction of the annulus contiguous to the bottom of the tube. Accordingly, he observes, that when the orifice of a small glass tube, open at both ends, is dipped in water, the small annular surface of glass, on the inside of the tube contiguous to the orifice, will draw up the water lying immediately under it, and every plate of water elevated will raise up that lying above it, until the weight of the column raised counterbalance the force by which this annulus endeavours to draw up more water. The thin plate of water lying over the lowest annulus, and every other plate of the elevated water, must be attracted upwards and downwards with equal forces, because the attracting surfaces above and below it are equal; and therefore the whole column of water, lying above the lowest annulus, being drawn equally in opposite directions, may be considered as unaffected by the attraction of the glass, and must press with its whole weight on the water retained at the orifice of the tube by the attraction of that lowest annulus, which has no other surface below it to counteract its force. Moreover, when the water has ascended into a small glass tube, open at both ends, take it up, and wiping off the drop hanging at the end of it, invert the tube: the small column of included water, being drawn equally by the glass in opposite directions, will descend by its own gravity, or stop only when it arrives at the lowest orifice. Or, whilst the included column is descending, let the lowest orifice be dipped in water, and taken up, and a small plate of water will be retained at its orifice, and then the included column will be quiescent. Now this column must, by means of the intermediate air, press with its whole weight upon the plate of water at its orifice, which can be retained by no other force than the attraction of the glass annulus, lying just within the orifice of the tube. From hence it appears, says Dr. Hamilton, that this attraction alone is sufficient to sustain, and consequently to raise all the water that rises in glass tubes. Against this reasoning Mr. Parkinson, (*ubi infra*) has alleged the following experiments. 1. Let a cylindrical glass tube be divided into very small equal annuli, a, b, c, d, e , &c. (fig. 4.) and a be-

ing dipped in water, a thin plate of the fluid will be detached from the mass, which being now in contact with the second annular surface b , possessing the same power of attraction with a , must, partly at least, be raised by it; and the case will be the same with the remaining annuli. And if the efforts of the intermediate annuli should be equal and opposite, which cannot be allowed, yet the superior annulus at g , would be unaffected, and its whole force remain entire, and it must contribute, at least, towards the support of the column of water. But that each annulus should exert a force in elevating the lamina of fluid contiguous to it, and not contribute towards the support of the fluid thus elevated, is unaccountable; the power of attraction being inherent in the glass, and inseparable from it. 2. Let the orifice, F , of the compound tube, EDF , (fig. 5.) be dipped in water, and it will rise to an altitude equal to gb ; and if DF be filled, so that the fluid be not in contact with the narrower part, it will subside till its height be equal to gb . But let the tube be filled so that the fluid be admitted into the narrower part at D , the height of the column suspended will be equal to af , though the lowest annulus continues the same. When this tube is inverted, and the orifice, E , dipped in the fluid, it rises to an altitude equal to af , if the narrower part of the tube be so long; and if ED be less than bg , it rises into the wider tube till its height be equal to bg , the same altitude as if the tubes were cylindrical, and its diameter equal to that of the wider. If these experiments be true, it is clear that the water, rising spontaneously in glass tubes, is neither raised nor supported by the attraction of the lowest annulus.

Others have maintained, and this opinion seems to be the most unexceptionable, that the attraction is proportional to the whole surface of the glass which is in contact with the column of water; for every point or particle of that surface possesses an equal attractive power; and the pressure of the suspended water is equivalent to it, or the one is a counterpoise to the other. This influence of glass, and other substances, upon fluids is scarcely perceptible beyond the immediate points of contact; nevertheless, it is clear, that a film of water of a certain thickness must be within the extent of that attractive power all round the inner surface of the tube, as high as the top of the pillar; but the rest of the water, which fills up the cavity of the tube, is attracted to that film, and is kept suspended by it, in consequence of the mutual attraction of the particles of water: yet the whole column is kept up by the attraction of the glass, and is a counterpoise to that force. Let water be kept suspended in the cylindrical glass tube, $ABCD$, (fig. 6.); and let the attraction of the glass extend to the lines, EG, FH ; and circles of the fluid, whose breadths are mn, rs , &c. will adhere to the surface, and certainly be supported by the immediate attraction of the glass, which is so great, that water suspended in a capillary tube will not evaporate, though exposed to the air for six or seven months; but the intermediate column, $EGHF$, is only supported by the adhesion of the particles of the fluid to these circles, and to the highest lamina, GH ; the attraction of any intermediate lamina, LM , being the same both upwards and downwards; and when the weight of this intermediate column exceeds their accumulated force, it must descend. This seems to be certain, that the shell of particles, $CEFD$, is sustained by the intermediate action of the glass, which is diffused to the intermediate lamina, np, st , &c. by the cohesion of the particles themselves; and in this manner the forces of the opposite points, m, q , and r, v , conspire, which does not obtain in the forces of the particles upon the outside of the tube; and this seems to be the reason why a column of the fluid is not elevated upon

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upon the outside, as it is within. Upon the whole it appears, that the pressure of the column of water in the tube is equivalent, or it is a counterpoise, to the attractive force of the surface of the glass, which is in contact with it; and of course it is proportional to that surface. But in estimating the quantity of that counterpoise, or of the pressure of the column of water, we must take into the account not only the quantity, but also the altitude; because, *ceteris paribus*, fluids press in proportion to their perpendicular altitudes; and when the base varies, as in different cylindrical pillars, the pressures are as the products of the quantity of matter by the altitude of each pillar respectively. Therefore the pressure of the pillar of water in a glass tube, which is a counterpoise to the attraction of the glass, is the product of the quantity of water by the altitude; and in cylindrical tubes, this product is always proportional to the surface of glass in contact with water. Having already shewn, that this surface is a constant quantity, it follows, that the product of the quantity of water by the altitude of the pillar must likewise be a constant quantity; since it is as the above-mentioned surface. In order to illustrate this by an example; let the inside of the diameter of a tube, *BC*, (*fig. 7.*) be double that of the tube, *DF*; then the pillar of water, *FE*, will be two inches high when the pillar, *AC*, is one inch high. Since the contents of cylinders of the same altitude are as the squares of their respective diameters, and their surfaces are simply as their diameters, it is easily calculated that if the quantity of water in the pillar, *EF*, weighs two grains, that of *AC* must weigh four grains; and likewise that the surface of glass in contact with the pillar of water, *EF*, is equal to the surface of glass which is in contact with the pillar of water, *AC*; hence it should seem that those equal surfaces ought to keep suspended equal quantities of water; whereas the quantity of water, *EF*, is the half of the quantity of water, *AC*; but the height of the pillar of water, *EF*, is double that of the pillar, *AC*; and consequently, its pressure, which is equal to the product of the quantity of water by the altitude (*viz.* two grains by two inches) is equal to the pressure of the column, *AC*, *viz.* the product of four grains by one inch.

If a tube consist of two cylinders, one *EF*, (*fig. 8.*) whose diameter is equal to that of the tube, *AB*, in which the water would rise to the height *AB*, and the other, a larger part, *CD*, whose diameter is equal to that of the tube, *GH*, in which the water would rise to the height *GH*; and if this compound tube be placed with the narrow aperture in water, as at *F*, the water will not rise in it higher than the altitude *GH*, *i. e.* to the same altitude to which it would rise if the tube were a uniform cylinder of the diameter of the large part. It might, indeed, be expected, that the water would rise higher than *D, G*; but it must be considered that though the product of the pillar of water, *EF*, by its altitude is less than a just counterpoise to the attraction of the surface, *EF*, of the glass; yet the excess of attraction of that surface, instead of aiding to support the water in *CE*, will operate in a contrary way: that is, if we state the attraction of the surface, *EF*, equal to 10, and if the pressure of the pillar of water in it be equal to 8; then the two remaining parts of attractive power will tend to draw the water from the basin as much as from the cavity, *DE*, towards the surface, *EF*; so that by the addition of the narrow tube, *EF*, the attraction of the larger part, *DI*, is diminished; at the same time that the water in it is partially supported by what may be called its perforated base, *IE*.

If a compound tube consisting of a larger part, *LN*, (*fig. 8.*) in which the water would rise spontaneously to the altitude, *M*, and of a narrower part, *OK*, equal in diameter to

the tube, *AB*, in which the water would rise to the height *AB*, be filled with water as high as *K*, and then be placed with the large aperture in water as at *N*, the whole quantity of water will remain suspended, filling the whole of the large tube and part of the narrow one. The same thing will also take place with a vessel of any shape, as *PQS*, provided its upper part be drawn into a narrow cylinder equal in diameter to the tube, *AB*. In these vessels the water is supported partly by the attraction of cohesion, and partly by the pressure of the atmosphere. That the pressure of the atmosphere contributes in a great degree to this effect is evident, because the water will not rise spontaneously into the vessels, *ON, PS*, to the heights *K* and *P*, and also because if these vessels full of water as high as *P, K*, together with the basin, be placed under the receiver of an air-pump, on exhausting the receiver of air or removing the pressure of the atmosphere, the water will descend in them, and will remain in them only as high as it would ascend spontaneously. Mr. Cavallo (*ubi infra*) has illustrated the mode by which water is supported in these vessels; and for this purpose he has calculated, that if the diameter of the aperture, *P*, be 0.004 of an inch, which will be nearly the case when the perpendicular altitude, *PQ*, of the water is 1 foot, the whole pressure of the atmosphere on the surface of the water in the tube at *P*, will be little more than one grain; and as the atmosphere presses upon that surface with only the 32d part of its entire force, the perpendicular height of the water in the vessel, *PQS*, being one foot, the actual pressure of the atmosphere on the surface of the water at *P*, will be $\frac{1}{1024}$ of a grain nearly. But this trifling pressure not being sufficient to overcome the attraction between the water and the surface of the tube, *P*, the water must remain suspended in the vessels, *PQS*, or *ON*. The following experiment corroborates this explanation. Fill the vessels, *ON*, or *PQS*, up to the height, *T*, by lowering them in the water of the basin; and in that situation touch the aperture, *O*, or *P*, with a wet finger, so as to introduce a little water into it. Then if the vessel be drawn up, leaving its lower aperture only in the water of the basin, the column of water, *TN*, or *TQ*, will remain suspended in it, though there be no communication whatever between the water at *T*, and the water in the capillary aperture.

The altitudes of water, suspended in compound tubes, vary inversely as the diameters of the upper orifices nearly. *E. G.* In open cylindrical tubes, whose diameters are equal to those of the different parts, *AB*, and *C*, (*fig. 9.*) of the compound tube, *ABC*, water rises spontaneously to altitudes equal to *gr*, and *gs*, which are inversely as their diameters nearly. Whether the orifice, *A* or *C*, be immersed in the fluid, it rises to the altitude, *gr*; but if the tube be filled, so that the water may be in contact with the narrow part of the tube, *C*, the whole column will be suspended, if its altitude does not exceed *gs*. Again, let *af*, and *bg*, (*fig. 10.*) be the altitudes of water raised spontaneously in the open cylindrical tubes, *ED*, and *DF*, respectively, which are inversely as their diameters. When the wider orifice is immersed, and the tube is filled with water to an altitude less than the length of the wider part, it will subside to a level with the point, *g*; but if the water be admitted into the narrower tube, the whole column will be suspended if its length do not exceed *af*. If the tube be inverted, and the narrower orifice immersed, and water raised into the tube, *DF*, it immediately sinks, if the altitude of the column exceed *bg*. Let *adc* (*fig. 11.*) be a capillary siphon, in whose narrower and wider legs, if sufficiently long, columns of water, whose altitudes are *ef*, and *gb*, respectively, and which are inversely as their diameters, may be suspended.

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suspended. Fill this siphon with water, and hold it in the position of *fig. 11*; and the fluid will not run out of the orifice, *c*, unless the difference of the legs, *dc*, exceed *ef*. If the narrower leg be longer than the wider, the water will flow out of the orifice, *c*, (*fig. 12*.) if the leg, *dc*, exceed *g b*.

Capillary tubes which naturally discharge water only in separate drops, yield, when electrified, a continued and accelerated stream; and the acceleration is proportional to the smallness of the tube: and the effect of electricity is so considerable, that it produces a continued stream from a very small tube, out of which the water had not before been able to drop. Priestley's *Hist. Electr.* 8vo. vol. i. p. 171. ed. 3d.

In connection with the preceding account of capillary tubes we shall here introduce that of contiguous glass plates, between which water rises according to the same law with that of such tubes, or in such a manner that the altitudes are inversely as the distances of the plates. E. G. If the glass plates be parallel to each other and placed with their lower edges in water, the water will rise between them, and will remain suspended at a certain height. This height is not so great as that of the water in a glass tube, whose diameter is equal to the distance between the two plates, for an obvious reason; because the water in the tube is surrounded on every side by glass: nevertheless the proportion is the same; i. e. in two or more pairs of glass plates, the altitudes of the water are inversely as the distances of the plates, and the cause of the ascent is the same as in glass tubes. A C D F and B C D E, (*fig. 13*.) represent two flat glass plates, placed so as to form a small angle, A C B, and immersed with their lower edges in water. The water will rise between them, and remain suspended in the space E F C D E, the outer edge of which, E F C, being a curve called an "hyperbola." One extremity of this curve rises as high as the upper part of the glass plates at C, and the other extremity reaches as far as the edges of the glasses contiguous to the water of the basin at F and E. The water between these plates rises higher near the side, C D; and lower at a distance from it. In short, at any distance from C D, as at *ab*, *cd*, *ef*, the water rises as high as it would rise between parallel plates, whose distance from each other equalled the distance between the plates of *fig. 15*, at any of those particular places. Consequently the altitudes of the water at different distances from C D, are inversely as the distances between the two plates at those places. In *fig. 14*, which exhibits the same elevation of water with that which is represented in *fig. 13*, any two, or more, altitudes of water, as *ab* and *cd*, are inversely as the distances *bt*, *di*, between the two plates at those places; viz. $ab : cd :: di : bt ::$ (by the similarity of the triangles *D bt*, *D di*) $D d : D b$; and this is the known property of the common hyperbola, whose asymptotes are the edge, C D, of the glasses, and the line, D S, where the glass plate intersects the surface of the water in the vessel, G. The water must evidently rise as high as the apex, C, whatever be the altitude of the plates, since the glass plates come infinitely near each other near the edge, C D. If these plates were bent more or less, then the edge of the water which rises between them would not be an hyperbola, but vary according to the curvature of the plates. Let two flat glass plates be disposed, as in *fig. 15*, so as to form a small angle with each other, as in the former case; and the lowermost of these be so placed as to form a small angle with the horizon, having the edge, B, a little elevated. Let them be separated at E C by the interposition of some thin body, and previously moistened with water; and if a drop of water be introduced between these plates at E C, so

as to touch them both, it will move spontaneously towards the upper part of the plates, as far as the edge, A B. The drop of water moves towards the edge, A B, even against the direction of its gravity; because the attraction of the glasses towards the drop is stronger where the plates are closer to each other, as at *d*, than where they are further asunder, as at *e*; so that the drop at *o*, is more powerfully attracted towards *d*, than towards *e*. If the side, A B, be gradually raised higher and higher above the horizon, whilst the drop is moving, it will be perceived to move slower and slower towards A B, until at last the gravity of the drop balances the attraction of the glasses, and the water remains at rest. After which, if the edge, A B, be raised still higher, the weight of the drop being greater than the attraction of the glass, will cause it to descend towards C E.

Phenomena of attraction, similar to those already illustrated in the case of glass and water, take place between almost every fluid and every solid; even between fluids and solids, or solids and solids. However, a considerable difference results from the different degrees of force with which the particles of each body attract either one another, or those of another body. The attraction of water to glass is greater than the mutual attraction of its own particles; it is also greater than that of any other fluid towards glass, not excepting even spirituous liquors, which are specifically lighter than water; and hence it is, that water rises higher in capillary tubes than any other liquor. Muschenbroek, Martin, and other writers have given tables of the heights to which different fluids ascend in capillary tubes. It is owing to this capillary attraction, that water rises through the fine vessels of wood, and ascends to the tops of the highest trees; that it insinuates itself through the pores of certain stones, through sand, sugar, salt, &c. and that in damp weather, when the air deposits a considerable quantity of water, wood, glue, ropes, linen, paper, parchment, salts, &c. imbibe the water, and are thereby swelled, moistened, softened, and some of them actually dissolved. Hence it is that metals in a fluid state rise and spread themselves between the contiguous surfaces of other metals that are in a solid state; and this is the foundation of the art of soldering metals. Hence also mercury insinuates itself through the pores of gold and tin; for the particles of mercury attract one another much less than they do those of gold or tin. See ASCENT OF FLUIDS. See also ADHESION and COHESION.

If glass be applied to any other fluid, whose particles attract each other more strongly than glass attracts them, all the phenomena of such a fluid in capillary tubes, and between glass plates, will be the reverse of those pertaining to water. Quicksilver is such a fluid; and, therefore, if a small globule of quicksilver be laid upon clean paper, and a piece of glass be brought into contact with it, the mercury will adhere to it, and will be drawn away from the paper: but if, whilst the small globule of quicksilver is thus adhering to the glass, a large quantity of the same fluid be brought in contact with the small globule, the latter will immediately disengage itself from the glass, and incorporate with the other mass. We here perceive that a greater degree of attraction subsists between the particles of mercury than between them and glass, so that it is impossible to spread quicksilver, like water, over the surface of glass. If quicksilver be put in a glass, and any wooden or earthen vessel, more than an inch in width, the surface of the quicksilver will be horizontal towards the middle, but convex towards the sides. If an iron ball be laid upon quicksilver, a depression of the quicksilver will be observed all round the ball. If two such balls be placed upon quicksilver, not very far asunder, they will run towards each other; because,

cause, where the cavities or depressions of the quicksilver are joined either between the ball and the side of the vessel, or between the two balls, there the pressure of the quicksilver upon the ball, or balls, is diminished by the attraction of the quicksilver below; and of course the balls are impelled that way by the superior pressure on the opposite sides. If a small tube, (*fig. 16*) open at both ends, be partly immersed in mercury, the mercury will be found to stand lower within the tube than in the vessel; and this depression has been found to be inversely as the diameters of the tubes. Thus, if two tubes are immersed in quicksilver, and the diameter of one is double that of the other, then the difference of perpendicular altitudes between the surface of the quicksilver in the latter tube and in the bason, will be double to the like difference with the former tube. As quicksilver is an opaque body, it will be necessary to hold the tube A B near the side of the vessel, which is supposed to be of glass, in order to render the depression of the quicksilver within the tube perceptible. The same thing takes place between parallel glass plates. If they be immersed in quicksilver, this fluid will stand lower between them than in the other part of the vessel; and the depression is likewise as the distances between the plates. If the plates be situated so as to form a small angle, the quicksilver, rising less near the angular edge than at a distance from it, will form a curve, which is an hyperbola, whose asymptotes are the perpendicular edge, or line of the junction of the glasses, and the level of the mercury in the bason. If a glass plate be laid in an horizontal situation, with a pretty large drop of quicksilver near one edge of it, as in *fig. 17*, which represents a section of it, and another glass plate, A B, be laid so as to form a small angle with it, and at the same time to compress the drop of quicksilver, the latter will move spontaneously towards O, *i. e.* towards the aperture of the angle, in order to recover its globular figure. If a tube open at both ends, but having its lower end drawn out into a fine capillary aperture, be filled with quicksilver to the altitude of about an inch or two, no mercury will escape from the lower aperture; but if this lower extremity be suffered to touch other mercury, or if, by breaking off part of the small end, the aperture be enlarged, the quicksilver will readily run out. For other particulars relating to this subject; see the articles to which we have already referred. Muschenbroek, *Introd. at Phil. Nat. tom. i. c. 20.* Grave-sand. l. i. c. 5. Helsham, *Lect. i. ii.* Cotes's *Hydrost.* &c. *Lectures*, *lect. xi.* Newt. *Opt. p. 380.* Hamilton's *Lect. ii.* Desaguliers *Course of Exp. Phil. vol. i. p. 10. p. 37, &c.* Martin's *Phil. Brit. vol. i. p. 24, &c.* Parkinson's *Syst. of Mechanics and Hydrostatics*, ch. v. Cavallo's *Elem. of Nat. or Exp. Phil. vol. ii. ch. 5.*

CAPILLARY vessels, in *Anatomy*, the most minute and subtle ramifications of the vessels of animal bodies. Many small vessels of animal bodies have been discovered by the modern invention of injecting the vessels of animals with a coloured fluid, which upon cooling grows hard. See **INJECTION**.

CAPILLARY worms, in children, are the same with what are otherwise called *crinones*, *comedones*, and *dracunculi*.

CAPILLATION, or **CAPILLARY fracture**, according to some writers, is a fracture in the skull, so small that it can scarcely be perceived; but yet it often proves mortal. See **FRACTURE**.

CAPILLITIUM VENERIS, in *Physiology*, denotes a meteor appearing in the air, in form of fine threads resembling a spider's web.

Some think that the capillitium Veneris derives its origin from a cloud, the watery parts of which having been exhaled by the sun's heat, only the earthy and sulphureous parts are left behind, which shoot into this figure. It is sometimes

also found hanging about woods and coppices, or even extended on the ground like a fine net, frequently enough mistaken for spiders' webs.

CAPILLUS. See **HAIR**.

CAPILLUS Veneris, in *Botany*, See **ADIANTUM CAPILLUS VENERIS**.

CAPILUPI, LELIO, CAMILLO, IPPOLITO, and JULIO, in *Biography*, natives of Mantua and distinguished as modern Latin poets. *Lelio*, who is said to have died in his native place in 1560, at the age of 62 years, excelled in the composition of centos, and applied some of the verses of Virgil to a description of the modes of life in monasteries, and of the venereal disease. *Camillo* wrote a book entitled "the Stratagem," in which he gives an account of the massacre at Paris on St. Bartholomew's day: he was not only distinguished as a poet, but employed in several embassies. He died in 1548. *Ippolito*, the third brother, was born in 1511, occupied several posts of dignity, and whilst he was first secretary and minister at Rome of cardinal Hercules and D. Ferrante Gozanga, wrote letters to both, several of which are extant. The most interesting are those that relate to the war of Parma and Mirandola carried on by pope Julius III. and they display much skill in negotiation and great zeal in the service of his master. In 1560 he was promoted to the bishopric of Fano by Pius IV. and in the following year deputed as his nuncio to Venice. He died at Rome in 1580. *Julio*, the nephew of the former, is said to have surpassed his uncle Lelio in the composition of centos. Some have said that Ippolito excelled in satirical poetry; but others affirm that he, as well as Julio and Camillo, excelled in the elegiac. The "Virgilian cento of the lives of Monks" was printed at Basil in 1556; and Meibomius published "Julii et Lælii Capiluporum patrum Centones Virgiliani, &c." at Helmstadt, in 4to. 1600. The "Carmina eorundem," appeared at Rome, 4to. 1527. The poems of the other brothers are printed in the first volume of the *Delicæ Poetarum Italarum*. Gen. Dict. Tiraboschi.

CAPINERO, in *Ornithology*, one of the synonyms of **MOTACILLA ATRICAPILLA**, being the name assigned it by Olin.

CAPIPLENIUM, from *caput*, head, and *plenus*, full, is used by some authors for a catarrh; but more properly, by the Italian physicians, for a continual heaviness of the head, frequent at Rome, and almost endemic.

CAPIRO, in *Geography*, a mountain of South America, being one of those that surround the harbour of Porto Bello, stands at the utmost extremity of the harbour in the road to Panama. Its top is always covered with clouds of a density and darkness seldom seen in those of this atmosphere; and from these, which are called the "Capillo," or cap, has possibly been corruptly formed the name of Monte Capiro. When these clouds thicken, increase in blackness, and sink below their usual station, it is a sure sign of a tempest. Whereas on the other hand, their clearness and ascent as certainly indicate the approach of fair weather. These changes are very frequent and very sudden; and the summit of the mountain is seldom observed free from clouds. Hence Capiro is regarded as the barometer of the country, by foretelling every change of weather.

CAPISCOLUS, or **CAPISCHOLUS**, in *Ecclesiastical Writers*, denotes a dignitary in certain cathedrals, who had the superintendency of the choir, or band of music, answering to what in other churches is called *chanter* or *precentor*. The word is also written *cabiscolus*, and *capulschole*, q. d. the head of the school or band of music. The capiscolus is also called *scolasticus*, as having the instruction of the young clerks and choristers, how to perform their duty.

CAPISSA,

CAPISSA, in *Ancient Geography*, a country of Asia, in Paropamisus, mentioned by Ptolemy and Pliny. The latter also mentions a town in this country, which was destroyed by Cyrus.

CAPISTRAN, JOHN, in *Biography*, a Franciscan friar, was born at Capistran in Naples, in 1385; and having first studied the law at Perugia, he relinquished this profession and entered into the order of St. Francis, in 1415. In this connection he rose, by the austerity of his manners, as well as by his zeal and eloquence, to the principal offices of his order. As he was ardently attached to the papal authority, he was employed in several important services by pope Eugenius IV.; and Nicholas V. sent him into Bohemia to convert the Hussites and the Jews; of the latter he caused many to be burnt in Silesia, under a pretence of their behaving irreverently towards the consecrated bread. He was also employed to preach a crusade against the Turks, in Germany, Hungary, and Poland; and he contributed by his eloquence to assemble the army, which, under the command of the famous Huniades, raised the siege of Belgrade, in 1456. Capistran, in his letter to the pope and the emperor, arrogates to himself the honour of this victory. Huniades, on the other hand, takes no notice of Capistran, who died within three months after the battle of Belgrade, and was buried in the convent of Willak, in Hungary. Miracles are said to be wrought at his tomb. He was canonized by pope Alexander VIII. in 1690, after having been beatified by Gregory XV. His principal works were "Speculum Clericorum;" "De Potestate Papæ et Consilii;" "De Pœnis Inferni et Purgatorii;" a treatise against the Hussites; and some pieces on the civil and canon law. Gen. Dict. Tiraboschi.

CAPISTRAN, in *Geography*, a small place, with a principality, of Naples, in the province of Abruzzo Ultra.

CAPISTRATUS, in *Ichthyology*, a species of *CHÆTODON*, with entire tail; twelve spines in the dorsal fin; body striated; and an ocellated spot near the tail.

This fish has the head rather large, with eyes of considerable size; a black ocular band with white margin; fins yellowish, with branched rays; dorsal and anal fin bordered with brown; and a black band near the caudal fin.

CAPISTRUM, *Lat.* a bandage used by performers on trumpets and other wind instruments among the ancients, to keep the cheeks and lips firm, and to prevent the distortion of the countenance. It was called *φορσεξ*, or *περιστομιον*, by the Greeks, and is supposed to have been invented by Marfyas. It is mentioned in Plutarch's Symposiasts, in the Scholiast of Aristophanes, and elsewhere, and may be seen in some ancient sculpture which Bartholinus has had engraved in his treatise "De Tibiis Veterum."

CAPISTRUM, in *Surgery*, a head-stall, or bandage used in case of injuries of the head, especially fractures of the jaw.

CAPITA, or **CAPITUM**, in *Antiquity*, denotes a tax among the Romans for the maintenance of the horses in the army, levied according to the number of heads thereof.

CAPITA, *distribution by*, in the *Civil Law*, is such a distribution, that every man has an equal share of *personal* estate, when all the claimants claim in their own rights, as in equal degree of kindred, and not *jure representationis*, in the right of another person. This mode of distribution is contradistinguished from a distribution *per stirpes*, which is the only rule of succession according to the common law. Thus, if the next of kin be the intestate's three brothers, A, B, and C; here his effects are divided into three equal portions, and distributed *per capita*, one to each; but if one of these brothers, A, had been dead, leaving three children, and another,

B, leaving two; then the distribution must have been *per stirpes*; viz. one-third to A's three children; another third to B's two children; and the remaining third to C, the surviving brother: yet, if C had been also dead, without issue, then A's and B's five children, being all in equal degree to the intestate, would take in their own rights *per capita*; viz. each of them one-fifth part. Blackst. Com. vol. ii. p. 517.

CAPITA, *succession by*, is that where the claimants are next in degree to the ancestor, in their own right, and not by right of representation. Thus, if the next heirs of Titius be six nieces, three by one sister, two by another, and one by a third; his inheritance by the Roman law was divided into six parts, and one part given to each of the nieces: whereas the law of England in this case would still divide it only into three parts, and distribute it *per stirpes*, thus; one-third to the three children who represent one sister, another third to the two who represent the second, and the remaining third to the one child who is the sole representative of her mother. Blackst. Com. vol. ii. p. 218.

CAPITAL, of the Latin *caput*, is used on various occasions to express the relation of a head, chief, or principal: thus,

CAPITAL City, intimates the principal city of a kingdom, province, or state; as London is the capital, or capital city of England; Moscow, of Russia; Constantinople, of the Ottoman empire; &c. See **CITY** and **METROPOLIS**.

M. Bayle has a discourse on the advantages of being born and living in the capital of the country.

CAPITAL Court, *capitalis curia*, the chief manor-house, or place-house where the lord of the manor holds his court; called also in Kent the court-lodge. See **COURT**.

Capital-court is sometimes used for the same with capital messuage, which see.

CAPITAL Crime, is that which subjects the criminal to a capital punishment, i. e. to the loss of life. See **CRIME** and **PUNISHMENT**.

CAPITAL Honour, *capitalis honor*, denotes the chief honour, or prime barony of the whole county, as that in ancient times usually enjoyed by the count or earl of such county.

CAPITAL Letters. See **CAPITALS**.

CAPITAL Lord, *capitalis dominus*, the lord of the fee, from whom the estate is held by inferior tenants.

CAPITAL Picture, in *Painting*, denotes one of the most excellent pieces of any celebrated master.

CAPITAL, or **CAPITAL Stock**, in *Commerce*, is the fund, or stock, of a trading company, or corporation; or the sum of money which they jointly furnish, or contribute, to be employed in trade. It is also used to denote the stock which a merchant or tradesman employs in business on his own account; or the sum of money which an individual advances towards making up the trading stock of a partnership when it is first formed. If we extend our views to society at large; the term stock is used in a greater latitude; and the whole stock which a man possesses may be distinguished into two parts; viz. that which is to afford him a revenue, and which is called his capital; and that which supplies his immediate consumption. See **STOCK**. A capital may be employed so as to yield a revenue or profit to its employer in two different ways, and accordingly acquires two distinct denominations. The capital, employed in raising, manufacturing, or purchasing goods, and selling them again with a profit, may properly be called a circulating capital; because it yields no revenue or profit, while the employer retains it in his own possession, and whilst it continues in the same shape; it is by means of circulation, or successive exchanges, that it yields any profit.

But if a capital be employed in the improvement of land, in the purchase of useful machines and instruments of trade, or in similar things which yield a profit without changing masters, or circulating any farther; this kind of capital may be called a fixed capital. Every fixed capital is originally derived from, and requires to be continually supported by a circulating capital: nor can the former yield any revenue but by means of the latter. The circulating capital also in its turn requires fresh supplies, without which it would soon cease to exist; and these supplies are principally drawn from three sources, viz. the produce of land, that of mines, and that of fisheries: the cultivation of which requires both a fixed and a circulating capital, and yields a profit, when their natural fertility is equal, proportional to the extent and proper application of the capitals employed about them; or, if the capitals are equal, and equally well applied, proportional to their natural fertility. The intention of the fixed capital is to increase the productive powers of labour, or to enable the same number of labourers to perform a much greater quantity of work. In a great country, the expence of maintaining a fixed capital may be compared to that of repairs in a private estate; and is thus necessarily excluded from the neat revenue of the society. But the case is different with respect to that which maintains the circulating capital. Of the four parts of which this latter capital is composed, viz. money, provisions, materials, and finished work, the three last are regularly withdrawn from it, and placed either in the fixed capital of the society, or in their stock reserved for immediate consumption. Whatever portion of these consumable goods is not employed in maintaining the former, goes altogether to the latter, and forms a part of the neat revenue of the society. In this respect the circulating capital of a society is different from that of an individual; the latter is totally excluded from making any part of his neat revenue, which must consist wholly in his profits. But though the circulating capital of every individual makes a part of that of the society to which he belongs, it is not on that account totally excluded from making a part likewise of their neat revenue. Although the whole goods in a merchant's warehouse or shop must by no means be placed in his own stock, reserved for immediate consumption, they may be so placed in that of other people, who, from a revenue derived from other funds, may regularly replace their value to him, together with its profits, without occasioning any diminution either of his capital or of theirs. Money, therefore, is the only part of the circulating capital of a society, of which the maintenance can occasion any diminution in their neat revenue. The fixed capital, and that part of the circulating capital which consists in money, so far as they affect the revenue of the society, bear a very great resemblance to one another. See MONEY. When we compare the quantity of industry which the circulating capital of any society can employ, we must always have regard to those parts of it only, which consist in provisions, materials, and finished work: the other, which consists in money, and which serves only to circulate those three, must always be deducted. Money may be requisite for purchasing the materials and tools of the work, as well as the maintenance of the workmen. But the quantity of industry which the whole capital can employ, is certainly not equal both to the money which purchases, and to the materials, tools, and maintenance, which are purchased with it; but only to one or other of these two values, and to the latter more properly than to the former. Smith's *Wealth of Nations*, vol. i. For the extension of capitals by the aid of banks and paper-credit; see BANK and PAPER-MONEY.

CAPITAL, in *Money Matters*, denotes the sum of money

put out to interest. In which sense it amounts to the same with *principal*, and stands opposed to *interest*. The borrower may use it either as a capital, yielding a certain annual rent to the lender, or as a stock reserved for immediate consumption. If he uses it as a capital, he employs it in the maintenance of productive labourers, who reproduce the value with a profit; in which case he will be able both to restore the capital and pay the interest without alienating or encroaching upon any other source of revenue. But if he uses it as a stock reserved for immediate consumption, he acts the part of a prodigal, and dissipates in the maintenance of the idle, what was destined for the support of the industrious; and in this case, he can never restore the capital nor pay the interest, without either alienating or encroaching upon some other source of revenue, such as the property or the rent of land. What the borrower in either of these ways really wants, and what the lender readily supplies him with, is not the money, but the money's worth, or the goods which it can purchase. If he wants it as stock for immediate consumption, it is those goods only which he can place in that stock. If he wants it as a capital for employing industry, it is from those goods only that the industrious can be furnished with the tools, materials, and maintenance, necessary for carrying on their work. By means of the loan the lender, as it were, assigns to the borrower his right to a certain portion of the annual produce of the land and labour of the country, to be employed as the borrower pleases. It is the value of that part of the annual produce, which, as soon as it comes from the ground, or from the hands of the productive labourers, is destined not only for replacing a capital, but such a capital as the owner does not care to be at the trouble of employing himself, that regulates the quantity of stock, or of money, which can be lent at interest in any country. As such capitals are commonly lent out and paid back in money, they constitute what is called the *monied interest*; which see.

These capitals may be greater in almost any proportion than the amount of the money which serves as the instrument of their conveyance; the same pieces of money successively serving for many different loans, as well as for many different purchases. Hence, a capital lent at interest may, in this manner, be considered as an assignment from the lender to the borrower of a certain considerable portion of the annual produce; upon condition that the borrower in return shall, during the continuance of the loan, annually assign to the lender a smaller portion, called the interest; and at the end of it, a portion equally considerable with that which had been originally assigned to him, called the repayment. In proportion as the share of the annual produce which, as soon as it comes either from the ground, or from the hands of the productive labourers, is destined for replacing a capital, increases in any country, what is called the "Monied Interest" naturally increases with it. The increase of those particular capitals from which the owners wish to derive a revenue, without being at the trouble of employing them themselves, naturally accompanies the general increase of capitals; or, in other words, as stock increases, the quantity of stock to be lent at interest grows gradually greater and greater. As capitals increase in any country, the profits which can be made by employing them necessarily diminish; and it becomes gradually more and more difficult to find within the country a profitable method of employing any new capital. In consequence of this there arises a competition between different capitals; the owner of one endeavouring to get possession of that employment which is occupied by another. The demand for productive labour, by the increase of the funds which are destined for maintaining it, grows every day

day greater and greater; so that labourers easily find employment, whilst the owners of capitals find it difficult to get labourers to employ. This competition raises the wages of labour, and sinks the profits of stock. But when the profits which can be made by the use of a capital are thus diminished, as it were, at both ends, the price which can be paid for the use of it, that is, the rate of interest, must necessarily be diminished with them. See *INTEREST*.

All capitals are destined for the maintenance of productive labour only; and yet the quantity of such labour, produced by equal capitals, varies very much according to the diversity of their employment; which is also the case with respect to the value added by that employment to the annual produce of the land and labour of the country.

A capital may be employed in four different ways; either, *first*, in procuring the rude produce annually required for the use and consumption of the society; or, *secondly*, in manufacturing and preparing that rude produce for immediate use and consumption; or, *thirdly*, in transporting either the rude or manufactured produce from the places where they abound to those where they are wanted; or, *lastly*, in dividing particular portions of either into such small parcels as suit the occasional demands of those who want them. In the first of these ways are employed the capitals of all those who undertake the improvement or cultivation of lands, mines, or fisheries: in the second, those of all master manufacturers; in the third, those of all wholesale merchants; and in the fourth, those of all retailers. Each of these methods of employing a capital is essentially necessary either to the existence or extension of the other three, or to the general conveniency of the society. The persons whose capitals are employed in any of these four ways are themselves productive labourers. Equal capitals, however, thus employed, put into motion very different quantities of productive labour, and augment also in very different proportions the value of the annual produce of the land and labour of the society to which they belong. But no equal capital puts into motion a greater quantity of productive labour than that of the farmer; and, of course, the capital employed in agriculture adds a much greater value to the annual produce of the land and labour of the country, and to the real wealth and revenue of its inhabitants. Consequently, of all the ways in which a capital can be employed, this is by far the most advantageous to the society. The capitals employed in the agriculture and in the retail trade of any community must always reside within that community. Whereas the capital of a wholesale merchant seems to have no fixed or necessary residence any where, but may wander about from place to place, according as it can either buy cheap or sell dear. The capital of the manufacturer must reside where the manufacture is carried on; but where this shall be is not always necessarily determined. It may frequently be at a great distance from the place where the materials grow, and from that where the complete manufacture is consumed. Thus, part of the wool of Spain is manufactured in Great Britain, and some part of that cloth is afterwards sent back to Spain. The same observation applies to the cotton manufacture. Whether the merchant whose capital exports the surplus produce of any society be a native or a foreigner, is of very little importance; but it is of greater consequence, that the capital of the manufacturer should reside within the country. It may, however, be very useful to the country, though it should not reside within it. The capitals of the British manufacturers, who work up the hemp and flax annually imported from the coasts of the Baltic, are without doubt very useful to the countries which produce them. The merchants who export the commodities wanted in these

countries, in exchange for these materials, replace the capitals of the people who produce them, and thus encourage them to continue the production; and the British manufacturers replace the capitals of those merchants.

When the capital of any country is not sufficient for all the three purposes now recited, in proportion as a greater share of it is employed in agriculture, the greater will be the quantity of productive labour which it puts into motion within the country, and also the value which its employment adds to the annual produce of the land and labour of the society. After agriculture, the capital employed in manufactures puts into motion the greatest quantity of productive labour, and adds the greatest value to the annual produce. That which is employed in the trade of exportation has the least effect of any of the three. The country, which has not capital sufficient for all these three purposes, has not arrived at that degree of opulence for which it seems naturally destined. But an attempt to accomplish all these three, prematurely, and with an insufficient capital, is certainly not the shortest way for a society, any more than for an individual, to acquire a sufficient one. The capital of all the individuals of a nation has its limits like that of a single individual, and is capable of executing only certain purposes; and it is increased by their continually accumulating and adding to it whatever may be saved out of their revenue: and the revenue of all the inhabitants of the country is necessarily in proportion to the value of the annual produce of their land and labour. The course of human prosperity, indeed, seems scarcely ever to have continued so long as to enable any great country to acquire capital sufficient for all these three purposes; unless, perhaps, we give credit to the wonderful accounts of the wealth and cultivation of China, of those of ancient Egypt, and of the ancient state of Hindoostan. These three countries have been chiefly renowned for their superiority in agriculture and manufactures; nor do they appear to have been eminent for foreign trade. The greater part of the surplus produce of all these countries seems to have been always exported by foreigners, who give in exchange for it something else for which they found a demand there, frequently gold and silver. It is thus that the same capital will in any country put into motion a greater or smaller quantity of productive labour, and add a greater or smaller value to the annual produce of its land and labour, according to the different proportions in which it is employed in agriculture, manufactures, and wholesale trade. See *TRADE*. The consideration of his own profit is the sole motive which determines the owner of any capital to employ it either in agriculture, in manufactures, or in some particular branch of the wholesale or retail trade; and, therefore, in countries, where agriculture is the most profitable of all employments, the capitals of individuals will naturally be employed in the manner most advantageous to the whole society. The profits of agriculture, however, seem to have no superiority over those of other employments in any part of Europe; insomuch that it would be difficult to produce a single instance, in which a large fortune has been acquired by agriculture, in the same time and from the same capital, which have yielded such a fortune by trade and manufactures, in the whole of Europe during the present century; and therefore agriculture is capable of absorbing a much greater capital than has ever yet been employed in it. *Smith's Wealth of Nations*, vol. ii. Book ii.

CAPITAL, in *Architecture*. This term is taken immediately from the Italian word *Capitello*, which is derived from the Latin *caput*, head. Thus the etymology of this

word defines its meaning, for the capital is properly the head of a column.

The capitals used in the architecture of the Greeks, though with numberless minute variations of ornaments and proportions, arrange themselves into three general classes, and offer the most obvious distinction between the orders. In this style also it is easy to distinguish between those parts which have their use and origin in the original type of that wooden construction from which Grecian architecture is derived and those which are merely ornaments and accessories. Considering columns in their origin as cylindrical wooden posts, the abacus which is a square tile or tablet has an evident use in sheltering and protecting the upper part of the column by its projection, and also in giving a broader bed and more convenient form for the placing of the architrave. The abacus therefore may be regarded as the original capital which is most conspicuous in that order which bears the marks of the lightest antiquity, attenuated and altered in succeeding orders and succeeding ages, but never omitted either in the purity of Grecian architecture or its deteriorated imitations.

The Doric order, which preserves more of the primitive type than any other, has a broad and massy abacus, which with an ovolo and some small fillets, varying in number from three to five, constitutes the whole capital. See *Plate XII. Architecture* and *Plate I. fig. 5 and 6.*

In the Ionic order we find a very considerable variation; here we have a small and moulded abacus, below which depend two spiral volutes; there is also an echinus and bead, see *Plate XXVIII. Architecture.* The side of the capital is different as the volutes appear only in front, and present a pillow or balluster laterally.

The Corinthian is the most richly ornamented of capitals; in this the abacus is hollowed, forming a quadrilateral figure with concave sides, the angles of which are generally truncated, and in the middle of each side there is placed a flower. Below the abacus the capital has the form of a vase or bell which is surrounded with two tier of leaves. Under each angle of the abacus rises a volute and caulicoli bend under the flowers which occupy the centres of the sides. See *Plate XXIX. Architecture.*

Such are the general characteristics which are common to all these capitals, but the variations are numerous. The Doric capital in Grecian examples varies in the more or less flattened form of the ovolo, in a greater or less number of annulets, in the proportions of the parts to one another, and to the column. In the Doric order, composed by modern authors from one or two imperfect Roman authorities, the case is very different; here we find a feeble abacus divided with mouldings; an ovolo and annulets, and below this a necking with an astragal and fillet. See *Plate XVI. Architecture.* The necking is even sometimes ornamented with husks and roses.

The principal variations of the Ionic capital in ancient examples are in the size of the volute, the form of its curve, and number of revolutions. In the capital of this order, in the temple of Minerva Polias, at Athens, a beautiful and singular instance, we observe an ornamented necking. See *Plate I. Architecture.* The circumstance of the Ionic capital being dissimilar in front and side, has caused considerable inconvenience in its use. For supposing a quadrangular portico to be erected of this order, the columns in front would all have the volutes outward, and the capitals at the angles would present the balluster side laterally; then either all the columns of the side ranges must have the balluster side outwards to correspond with those at the angles, which would be a sin-

gular absurdity, or uniformity must be violated. To remedy this defect, the ancients made the outer volute of the angular capital project diagonally, so as to correspond equally with a volute in front and one on the side. This distorted capital, however, was considered so great a blemish, that most modern architects, when they had occasion to use Ionic columns on plans fronting two ways, have adopted the invention of Scamozzi, which consists in projecting all the volutes diagonally, thus forming a capital similar every way, while the abacus has the form of the Corinthian abacus, and like that has a flower in the centre of each side. It is this which is called the modern Ionic capital; an invention which only obviates the difficulty complained of, by spoiling all the capitals, instead of merely those at the angles, for in beauty and elegance these capitals will not bear the smallest comparison with antique examples. This practice was greatly approved at the time, and nearly superseded the ancient method even in circumstances where no accommodation was necessary.

The Corinthian capital varies in the division and form of the leaves; these are directed by Vitruvius to be of the acanthus kind, and thus we find them in the order of the temple of Vesta at Tivoli. The greater number however, both of ancient and modern capitals, are composed of olive leaves, which have three, four, or five folds in each division. The general height too varies from 57 to 77 minutes. Perhaps the most beautiful example extant of a Corinthian capital, is that of the three columns in the Campo Vaccino at Rome, supposed to be the remains of a temple of Jupiter Stator. See *Plate XXIX. Architecture.*

It remains to speak of the Tuscan capital. There are no well authenticated remains of this order, and the precepts of Vitruvius on this head are so obscure that the modern compilers of systems of architecture have of course varied exceedingly in their designs, and the order that passes under this name must be regarded rather as a modern than an ancient invention. It has been made to differ from the modern Doric by an air of poverty and rudeness, by the suppression of parts and mouldings. See *Plate XIV. Architecture.*

The Composite appears never to have been admitted as a separate order by the ancients (see *COMPOSITE order*). It will, however, be necessary to describe what by modern architects has been denominated the Composite capital. This is a combination of Ionic and Corinthian forms; the upper part has the shape of a modern Ionic capital, and the lower part is surrounded with two tier of acanthus leaves. See *Plate XXVII. fig. 4. Architecture.* Of this capital there are a few examples at Rome.

From the remains of Egyptian antiquity, it appears, that the architects confined to the severest simplicity in the general forms of their buildings and principles of construction, acknowledged no given rules or orders of architecture for the proportions and ornaments of inferior members. Accordingly we find an infinite variety of capitals, many of them possessing great richness of decoration and elegance of outline. The ornaments are in general accurate imitations of the natural productions of the country, such as the lotus, the reed, or the palm. In *Plate XXVI. Architecture*, the reader is presented with various fragments of Egyptian architecture. Here *fig. 1*, is an elegant capital composed of the branches and leaves of the palm and the capsules of its fruit. *Fig. 2*, is a bundle of tufts of palm stalks, taken in the spring when the branches and leaves are not yet unfolded, and the whole tree resembles a single flower bud. In *fig. 6*, we may observe a considerable resemblance to the volutes of the Ionic capital. *Fig. 8*, is a capital from the temple of Tentyra, composed of the head of Isis and the attributes of this goddess.

The embles of the ancient inhabitants of Hindoostan, works of dateless antiquity, present many capitals of extraordinary form and composition. In some of these we find represented the figures of elephants and horses, apparently crouching under the weight of the ceiling. Capitals very similar in ideas to these are also found in the ruins of Persepolis, composed of horses and camels.

As Roman architecture sunk into the degraded and barbarous style, known in this country by the name of Saxon and Norman, which was finally superseded by the mode commonly called Gothic, ancient rules were forgotten or despised. Ornaments were abandoned to the caprice of the carver, and an endless variety of capitals was produced more or less happy according to individual taste or barbarism. Variety indeed seems to have been the governing principle of decoration, and was pursued to an unmeaning excess in contempt of symmetry, propriety, and congruity.

CAPITAL, in *Chemistry*, signifies the head of an alembic.

CAPITAL, in French *capitale*, in *Fortification*, of a work, is an imaginary line dividing that work into two equal and similar parts. Every work in a fortification has its capital. The capital of a bastion, for instance, is the right line drawn from the point or salient angle of it to the middle of the gorge, or from the angle of the interior or inward figure, or polygon, to the salient angle of the bastion, or flanked angle. A bastion is said to have a certain number of toises or fathoms of capital, when there are just so many in the distance from its salient angle to the point where the two demi-gorges meet each other.

The capital of a ravelin or demi-lune is a right line drawn from the re-entering angle of the counterescarp to the point or to the flanked or salient angle of the ravelin.

CAPITAL of a Lantern, the covering which terminates the lantern of a dome, either in the figure of a bell, as that of the Sorbonne; or of a cupola, or a spiral, as that of the church of Sapienza at Rome.

CAPITAL of a Mill, the covering thereof in form of a cone, which turns vertically on the round tower, in order to expose the sails to the wind.

CAPITALS, or *Capital letters*, in *Printing*, denote large or initial letters, which are used in the titles of books, and on a variety of other occasions. It was formerly the custom to begin every noun with a capital; but the practice, being troublesome, and giving to the writing or printing a confused appearance, has been discontinued. Capitals, however, may very properly commence the first word of every book, chapter, letter, note, or any other piece of writing:—the first word after a period, and, if the two sentences are totally independent, after a note of interrogation or exclamation; but if a number of interrogative or exclamatory sentences are thrown into one general group, or if the construction of the latter sentences depends on the former, all of them, except the first, may begin with a small letter:—the appellations of the Deity:—proper names of persons, places, streets, mountains, rivers, ships:—adjectives derived from the proper names of places:—the first word of a quotation, introduced after a colon, or when it is in a direct form; but when a quotation is introduced obliquely after a comma, a capital is unnecessary:—the first word of an example:—every substantive and principal word in the titles of books:—and the first word of every line in poetry. The pronoun *I*, and the interjection *O*, are also written in capitals. Other words, beside the preceding, may likewise begin with capitals, when they are remarkably emphatical, or the principal subject of the composition. Murray's English Grammar, p. 273, ed. 12.

The ancient MSS. both Greek and Latin, are written wholly in capitals.

In the early days of printing, there were also several editions of books in capitals; as of Homer, the Greek Anthology, Apollonius, &c. Johannes Lascaris seems to have brought the ancient printers to give editions in capitals.

CAPITALIS reflexa, in *Surgery*. See **CAPELINE**.

CAPITAN, an extravagant *janfaron*, a forward, vain, impudent braggadocio, who boasts of great exploits, whilst he is in reality but shy, timid, and dastardly. It is a term sometimes made use of to denote an absolute coward or poltroon.

CAPITANA, or **CAPTAIN galley**, the chief or principal galley of a fleet, not dignified with the title of a kingdom. The capitane was anciently the denomination of the chief galley of France, which the commander went on board of. But since the suppression of the office of captain general of the galleys in 1669 they have no capitana, but the first galley is called *reale*, and the second *patrone*.

CAPITANATA, in *Geography*, corrupted from *Catapana*, denoting the district under the *Catapan*, or Greek viceroy, the ancient "Apulia Daunia," but detached from "Apulia" by captain Basilus Bugiano, or Bagiano, one of its Greek governors, and erected by him into an independent province; one of the 12 provinces of Naples. It is bounded on the north and east by the Adriatic, on the south by the provinces of Bari, Basilicata, and Principato Ultra, and on the west by the Molise and Abruzzo Citra. The country is for the most part level, has few trees and springs; the air is hot, and the soil sandy; nevertheless the land, refreshed by dews, and adjoining the rivers, produces corn, and furnishes pasture for herds of cattle. The springs in the country of Manfredonia, near mount Gargano, the chief mountain of the province, are more plentifully supplied with fresh water. The sides of this mountain afford plantations of oranges; the stones dug within it are used for building in various parts of the province; and from the top is collected snow, which is of great service in this hot country. Along the coast, which is defended by a number of towers, there are manufactures of salt. Its principal towns are Manfredonia, the capital, Viesti, Lucera, San Severo, Larino, Troja, Termoli, Bovino, Voltarara, and Ascoli. The extent of this province comprehends 1,141,622 moggie (5 moggie being equal to 4 English acres), and the number of inhabitants amounts, according to Swinburne, to 491,255.

CAPITANEATE, in a general sense, the same with capitania. Capitaneates, in Prussia, are a kind of noble fiefs, or estates, which, besides their revenue, raise their owners to the rank of nobility. They are otherwise called *starosties*.

CAPITANEI, or **CATANEI**, in Italy, was a denomination given to all dukes, marquises, and counts, who were called "capitanei regis." The same appellation was also given to persons of inferior rank, who were invested with fees, formerly distinguished by the appellation of *valvassores majores*. Du Cange.

CAPITANEUS, **PETER**, or **CAPITEYN**, in *Biography*, born of a noble family at Middlebourg in Zealand, in the year 1514, received his education in the universities of Louvain and Paris. After taking his degree of doctor, he went to Copenhagen, was made professor in medicine, and first physician to the king, Christian III.; which offices he appears to have held to the time of his death, which happened in the year 1557, as is seen by a chronogram engraved on his tomb:

"Occubuit fatis CapitaneUs aLta MICaret,
JanI seXta Ubi LUX horaQue nona foret."

He was also honoured with an epitaph by Ant. Balderflesben.

ben. His works are, "De Potentiis Animæ," printed in 1550, and "Prophylacticum Consilium anti-peffilientiale," published 1553. It was afterwards given by Thos. Bartholine, in his "Cista Medica," printed at Copenhagen in 1692.

CAPITANEUS, in *Conchology*, a species of *CONUS* described by Linnæus: the shell is conic, glabrous, with fuscous base; and the spire somewhat convex.

This is an Asiatic species. The colours are various, as olive, yellow, fuscous, chestnut, or an intermixture of some of them, but is very scarce of one colour only. Commonly there are one or two whitish bands, with numerous rows of dots, and square or undulated spots of a darker colour than the prevailing tint of the shell. Many interesting varieties of this species are figured by Chemnitz, Favanne, and other writers.

CAPITANEUS, in *Ancient Law Writers*, denotes a tenant in capite, or chief. See **CAPITE**.

CAPITANEUS Ecclesie, the same with *advocate*, which see. Du-Cange, Gloss. Lat. tom. i. p. 802.

CAPITANIA, the office or dignity of a captain, and more especially a perpetual fend. See **CAPITANEATE**.

CAPITANIA is also a denomination given to the twelve governments established by the Portuguese in Brasil.

CAPITATÆ, in *Botany*, the ninth class in Mr. Ray's second method, containing those compound flowers which are united in a roundish form, resembling a head, as the thistle, knapweed, &c. It is also the second division of the twenty-first order in Linnæus's fragments of a natural method published in the Philosophica Botanica; the first division of the forty-ninth order at the end of the Genera Plantarum, and in the posthumous prelections; and the second division of the first order of the class Syngenesia in his artificial system.

CAPITATE, forming a head; applied particularly to a flower, and to the stigma.

CAPITATION, a tax, or imposition, raised on each person, in consideration of his labour, industry, office, rank, &c. This kind of tribute is very ancient, and answers to what the Greeks called *επιτεφθαλον*; the Latins, *capita*, *capitatio*, and *tributum*, or *tributum capitis*, or *capitulare*. By this term, taxes on the person are distinguished from taxes on merchandize, which were called *veſtigalia*, *quia vehebantur*.

Capitation obtained among the Jews. Accordingly Moses ordained (Exod. xxx. 30.), that every Israelite should pay half a shekel "for his soul," or person, as a redemption, "that there might be no plague among the people, when they were numbered." Several interpreters have supposed, that this was intended to take place as often as the people were numbered; and that the evasion of it, when David numbered his subjects, incurred the divine punishment of a pestilence. 2 Sam. xxiv. 1. But it has been more generally maintained, that Moses laid this tax on all the people, payable yearly, for the maintenance of the tabernacle, for the sacrifices, wood, oil, wine, flour, habits, and subsistence of the priests and Levites. In the time of our Saviour, this tribute was punctually paid. See **DIDRACHMA**. The rabbins observe that even the priests and Jews in general, except women, children under 13 years of age, and slaves, were liable to pay the half shekel, worth about 1s. 6d. The collectors demanded it in the beginning of Nisan, but had no recourse to compulsion till the passover; when they either constrained those to pay who had not paid, or took security from them.

The Israelites, on their return from Babylon, paid one-third part of a shekel to the temple; as they were, probably,

unable, on account of their poverty, to pay a greater sum. Nehem. x. 32. After the destruction of the temple by the Romans, the Jews were compelled to pay the half shekel to the temple of Jupiter Capitolinus, which they had before paid to the temple at Jerusalem. It was levied through all the provinces where any of them were settled, and carried by procurators to Jerusalem. Cicero observes, that Flaccus would not suffer that tax, which was collected among the Jews in Italy, to be conveyed thither; and Titus, addressing the Jews, reproaches them with ingratitude for employing this tax against their benefactors, and in carrying on the war with the Romans, which the emperors of Rome had, by a particular indulgence, permitted them to levy. Calmet.

The mode of assessment under the Roman emperors seemed to unite the substance of a land-tax with the forms of a capitation. The returns which were sent of every province or district, expressed the number of tributary subjects, and the amount of the public impositions. The latter of these sums was divided by the former, and the estimate, that such a province contained so many "capita," or heads of tribute, and that each head was rated at such a price, was universally received, not only in the popular, but even in the legal computation. The value of a tributary head must have varied, according to many accidental, or at least fluctuating circumstances; but it is known, that the rapacious ministers of Constantius had exhausted the wealth of Gaul, by exacting 25 pieces of gold for the annual tribute of every head; which capitation was reduced by the humane policy of his successor to 7 pieces. If we take 16 pieces of gold, or about 9l. sterling, for a kind of moderate proportion between these opposite extremes of extraordinary oppression and of transient indulgence, we shall have probably the common standard of the impositions of Gaul. When we reflect on this subject, it is obvious, that as long as a very unequal division of property must subsist in society, the most numerous part of the community would be deprived of their subsistence by the *equal* assessment of a tax, from which the sovereign would derive a very trifling revenue. But, whatever might be the theory of the Roman capitation, in the practice this unjust equality was no longer felt, as the tribute was collected on the principle of a *real*, not of a *personal* imposition. Several indigent citizens contrived to compose a *finge head*, or share of taxation; while the wealthy provincial, in proportion to his fortune, alone represented several of those imaginary beings. Nevertheless, the difficulty of allowing an annual sum of about 9l. sterling, even for the average of the capitation of Gaul, will be more evident by comparing the state of the same country, as it was governed by an absolute monarch of an industrious, wealthy, and affectionate people, before the late revolution. The taxes of France, estimated at the annual amount of 18 millions sterling, may be considered as distributed among 24 millions of inhabitants. Seven millions of these, in the capacity of fathers, brothers, or husbands, might discharge the obligations of the remaining multitude of women and children; and yet the equal proportion of each tributary subject would scarcely rise above 50s. of our money, instead of a proportion almost four times as considerable, which was regularly imposed on their Gallic ancestors. The reason of this difference is to be found, not so much in the relative scarcity or plenty of gold and silver, as in the different state of society in ancient Gaul and modern France. In a country where personal freedom is the privilege of every subject, the whole mass of taxes, whether they are levied on property or on consumption, may be fairly divided among the whole body of the nation. But the far greater part of the lands of ancient Gaul, as well as of the other provinces of the Roman world, were cultivated by slaves, or peasants, whose

dependent condition was a less rigid servitude. In such a state the poor were maintained at the expence of their masters; and as the rolls of tribute were filled only with the names of those citizens who possessed the means of an honourable, or at least of a decent subsistence, the comparative smallness of their number explains and justifies the high rate of their capitation. The population of the territory of the *Ædui* might probably amount to 800,000 persons; and in the time of Constantine, this territory afforded no more than 25,000 *heads* of capitation, of whom 7000 were discharged by that prince from the intolerable weight of tribute. By a just analogy it may be inferred, that the free and tributary citizens did not surpass the number of half a million; and if their annual payments may be computed at about $4\frac{1}{2}$ millions of our money, it would appear, that although the share of each individual was four times as considerable, a fourth part only of the modern taxes of France was levied on the imperial province of Gaul. The exactions of Constantius may be calculated at 7 millions sterling, which were reduced to 2 millions by the humanity or the wisdom of Julian. But as this tax, or capitation, on the proprietors of land, would have suffered a rich and numerous class of free citizens to escape, the emperors, with the view of sharing that species of wealth which is derived from art or labour, and which exists in money or in merchandise, imposed a distinct and personal tribute on the trading part of their subjects. Some exemptions, very strictly confined both in time and place, were allowed to the proprietors who disposed of the produce of their own estates. Some indulgence was granted to the profession of the liberal arts; but every other branch of commercial industry was affected by the severity of the law; nor did the sovereign of the Roman empire, who tolerated the profession, disdain even to share the infamous salary, of public prostitutes. This general tax upon industry was collected every fourth year, and hence called the "Lustral Contribution;" and the fatal period was announced by the tears and terrors of the citizens, who were often compelled by the impending scourge to embrace the most abhorred and unnatural methods of procuring the sum at which their property had been assessed. Gibbon's Hist. vol. iii. chap. 17.

Capitation taxes, says Dr. Smith, (*ubi infra*), if an attempt is made to proportion them to the fortune or revenue of each contributor, become altogether arbitrary. The state of a man's fortune varies from day to day, and without an inquisition more intolerable than any tax, and renewed at least once every year, can only be guessed at. His assessment, therefore, must in most cases depend upon the good or bad humour of his assessors, and must, consequently, be altogether arbitrary and uncertain. Capitation taxes, if they are proportioned not to the supposed fortune, but to the rank of each contributor, become altogether unequal; as the degrees of fortune are frequently unequal in the same degree of rank. Such taxes, therefore, if it is attempted to equalize them, become altogether arbitrary and uncertain; but if it is attempted to render them certain, and not arbitrary, they become altogether unequal. In the different poll-taxes which took place in England, during the reign of William III. the contributors were mostly assessed according to their rank, as dukes, marquises, earls, viscounts, barons, esquires, gentlemen, the oldest and youngest sons of peers, &c. All shopkeepers and tradesmen worth more than 300l. were subject to the same assessments, whatever might be the difference in their fortunes. Several of those who in the first poll-tax were rated according to their supposed fortune, were afterwards rated according to their rank. Serjeants, attornies, and proctors at law, who in the first poll-tax were assessed at three shillings in the pound of their

supposed income, were afterwards assessed as gentlemen. In the capitation tax levied in France, for a long time without interruption, since the beginning of the last century, the highest orders of persons were rated according to their rank by an invariable tariff; the lower orders of people, according to what was supposed to be their fortune, by an assessment that varied from year to year. The officers of the king's court, the judges and other officers in the superior courts of justice, the officers of the troops, &c. were assessed in the first manner: the inferior ranks of people in the provinces were assessed in the second.

In England the different poll-taxes never produced the sum which had been expected from them. In France the capitation always produced such a sum. The mild government of England, when it assessed the different ranks of people to the poll-tax, contented itself with what that assessment happened to produce; and required no compensation for the loss which the state might sustain either by those who could not pay, or by those who would not pay, and who, by the indulgent execution of the law, were not forced to pay. The more severe government of France assessed upon each generality a certain sum, which the intendant must find as he could. If any province complained of too high an assessment, it might, in the assessment of next year, obtain an abatement corresponding to the overcharge; but it was required to pay in the mean time. Capitation taxes, as far as they are levied upon the lower ranks of the people, are direct taxes upon the wages of labour, and are attended with all the inconveniences of such taxes. They are levied at little expence; and where they are rigorously exacted, afford a very sure revenue of the state. Hence, in countries where the care, comfort, and security of the inferior ranks of people are not objects of much attention, capitation taxes are very common. It is, however, but a small part of the public revenue, which, in a great empire, has ever been drawn from such taxes: and the greatest sum, which they have ever afforded might always have been found, says Dr. Smith, in some other way much more convenient to the people. Wealth of Nations, vol. iii. b. 5. c. 2.

CAPITATUS, in *Ichthyology*, an obsolete name of that fish most commonly known in England by the name of Miller's thumb, *Cottus Gobio*, and river bull-head of approved authors.

CAPITE, in *Law*, an ancient tenure, whereby a person held of the king immediately, in right of his crown and dignity, either by knight's service, or socage, which see. This was the most honourable species of tenure; but at the same time it subjected the tenants to greater and more burthen-some services than inferior tenures did.

By a statute, 12 Car. II. c. 24. all such tenures by knight's service of the king, or of any other person, knights' services *in capite*, with all rights, &c. are annulled: and all such tenures are turned into free and common socage; so that tenures hereafter to be created by the king are to be in common socage only, and not by *capite*, knight's service, &c.

CAPITE *censu*, in *Antiquity*, the lowest rank of Roman citizens, who in public taxes were rated the least of all, being such as were never worth above 365 asses.

They were supposed to have been thus called, because they were rather counted and marshalled by their heads than their estates. Aul. Gell. lib. vii. cap. 13.

The capite *censu* made part of the sixth class of citizens, being below the *proletarii*, who formed the other moiety of that class.

The capite *censu* were not enrolled in the army, as being judged not able to support the expences of war; for in those days.

days the soldiers maintained themselves. It does not appear that before Caius Marius any of the Roman generals lifted the capite censi in their armies. Sallust. Jug. p. 135.

CAPITELLUM, in *Conchology*, a species of *VOLUTA* with an ovate, rugged, knotty shell, the pillar of which is triplicated.—*Murex capitellum* of Linnæus. This is about two inches and three quarters in length; colour white, sometimes fasciated with fuscous, and marked with decussating ribs. This inhabits the Indian and American seas.

CAPITO, WOLFGANG-FABRICIUS, in *Biography*, an eminent Lutheran divine, was born in 1478 at Hagenau in Alsace, and having studied at Basil, became, in compliance with the desire of his father, a doctor in medicine. He afterwards graduated both in theology and law; and entering in 1520 into the service of cardinal Albert of Brandenburg, elector of Mentz, received from him letters of nobility. After having embraced the opinions of Luther, he formed an intimacy with Bucer and Oecolampadius, and concurred with them in the establishment of protestantism. He assisted at the council of Marburg in 1529; and after having been twice married died of the plague in 1542. Among the various works which he wrote we may select the following; viz. "Institutionum Hebraicarum lib. ii;" "Enarrationes in Habacuc et Oseam;" "Vita Joannis Oecolampadii;" "Responso de Matrimonio, et Jure Magistratus in Religionem." Moreri.

CAPITO, TITINIUS, lived under the emperor Trajan, and is mentioned by Pliny (l. viii. ep. 12) as a writer of no mean character. He described the deaths of illustrious men, among whom were some of his contemporaries, condemned, without doubt, by Domitian.

CAPITO, ATEIUS, a celebrated civilian, who adorned the age of Augustus and was distinguished by the favour of his sovereign. He was an opponent of Antistius Labeo, who was more illustrious by his contempt of that favour, and his stern, though harmless opposition to the tyrant of Rome. Their legal studies were influenced by the various colours of their tempers and principles. Labeo was attached to the form of the old republic; his rival embraced the more profitable substance of the rising monarchy. Capito, with the tame and submissive disposition of a courtier, seldom presumed to deviate from the sentiments or at least from the words of his predecessors; while the bold republican pursued his independent ideas without fear of paradox or innovation. Labeo decided according to the letter of the law the same questions which his indulgent competitor resolved with a latitude of equity more suitable to the common sense and feelings of mankind. This opposition of sentiments was propagated in the writings and lessons of the two founders; and the schools of Capito and Labeo maintained their inveterate conflict from the age of Augustus to that of Adrian. The two sects derived their appellations from Sabinus and Proculus, their most celebrated teachers. Gibbon's Hist. vol. viii. p. 31.

CAPITO, in *Ichthyology*, an old synonym of the Chub, *CYPRINUS CEPHALUS*, which see.

CAPITO is also applied by some of the elder writers to the Mullet, *MUGIL CEPHALUS*, which see.

CAPITO, *anadromus*, one of the synonyms of *CYPRINUS VIMBA*.

CAPITO fluvialis (Aldrovandus) *CYPRINUS DOBULA*, Mull. and Gmelin.

The true species to which the names *Capito caruleus*, and *capito rapax* are applied by obsolete writers do not appear to be very clearly ascertained.

CAPITOL, **CAPITOLIUM**, in *Antiquity*, a famous fort or castle, on the Mons Capitolinus at Rome, wherein was a temple dedicated to Jupiter, thence also denominated *Capitolinus*, in which the senate anciently assembled; and which still serves as the city-hall, or town-house, for the meeting of the conservators of the Roman people.

It had its name, *capitol*, from *caput*, a man's head, said to have been found fresh, and yet bleeding, upon digging the foundation of the temple, built in honour of Jupiter. Arnobius adds, that the man's name was Tulus; whence *capitolium*. Others say, that the hill Tarpeius was called *capitol*, because it was the capital, or chief fortress of Rome.

The first foundations of the Capitol were laid by Tarquin the Elder, in the year of Rome 139. B. C. 615. In consequence of a vow which he had made to Jupiter, Juno, and Minerva, on occasion of his last battle with the Sabines, in which he obtained the victory, he levelled the steep top of the Tarpeian hill, marked out the plan of the temple, which he had promised to erect, and laid the foundation of that glorious structure, which afterwards became the principal place of the Roman worship. Historians have adorned the foundation of this temple with many prodigies, all portending the future grandeur of the Roman empire. As there were several gods, who had altars on the same hill, and which were to be removed to make room for the new edifice, it was a matter of doubt in what part of the hill the foundations should be dug. The augurs resolved to consult each deity one after another, and not to touch their altars before they had given their consent. All the gods agreed that their altars might be removed, except the god Terminus and the goddess Youth, who insisted upon not being displaced; and this circumstance gave the augurs occasion to conjecture, that the bounds of the city and empire should stand for ever, and that Rome should always flourish with youth and vigour. Accordingly the two deities were enclosed within the walls of the temple. Dionysius Halicarnassensis places this event under Tarquin the Elder, and Livy under Tarquin the Proud. The successor of the former, Servius Tullius, as some have said, raised the walls; and Tarquin the Proud finished it, A. U. C. 221, B. C. 533, having reserved for this purpose the tenths of the spoils of Sueffa Pomatia, one of the most wealthy cities of the Volsci, and having procured a great number of workmen from Etruria, to begin the undertaking, who were assisted in the most laborious part, by his own subjects. But his expulsion from Rome prevented his accomplishing all his purposes. Thus the edifice was not completed and consecrated till the third year after the expulsion of the kings, and establishment of the consulate. The ceremony of the dedication of the temple was performed by the consul Horatius, A. U. C. 246; B. C. 508.

The Capitol occupied eight acres of ground; it was 200 feet broad, and about 215 long. It consisted of three parts; a nave, sacred to Jupiter; and two wings, or ailes, to Juno and Minerva. It was ascended from the forum by stairs; Lipsius reckons one hundred in number, because there were so many in the ascent of the Tarpeian rock. The front which looked to the south, facing the hill Palatinus, and the Forum Romanum, and the sides were encompassed with galleries, wherein those, who had the honour of a triumph, entertained the senate at a magnificent banquet, after the performance of sacrifice to the gods. Both inside and outside were enriched with numerous ornaments: the statue of Jupiter, with his golden thunderbolt, his sceptre, and crown, were the most distinguished. The gilding of the whole arch of the temple of Jupiter Capitolinus was undertaken by the Romans, according to Pliny (lib. xxxiii.) after the destruction of Carthage, and if Plutarch (in Octav.)

tav.) may be credited, it cost 12000 talents. The gates of the temple were of brass, covered with large plates of gold. The inside of the temple and the columns which supported it, were all of marble.

In the same Capitol there were, likewise, a temple to Jupiter the Guardian, and another to Juno; with the mint: and on the descent of the hill was the temple of Concord.

The Capitol was burnt in the time of Sylla (A. U. C. 670. B. C. 84), by the negligence of those who kept it. He undertook to rebuild it, but did not live to see it finished, which he lamented in his last illness "as the only thing wanting (says Tacitus, Hist. iii. 72) to complete his felicity." By his death that charge fell to Q. Lutatius Catulus, as being consul at the time, B. C. 79, who dedicated it with great pomp and solemnity, and had the honour to have his name inscribed on the front. It was burnt a second time in the reign of Vitellius, the 19th of December, A. D. 69, and rebuilt under Vespasian, who completed what Helvidius Priscus had begun. It was burnt again in the reign of Titus, A. D. 80, and rebuilt by Domitian with a sumptuous magnificence which had no bounds. But it was always re-erected on the old foundations of Tarquin, and its parts, however highly ornamented, preserved the same proportions.

No remains of the ancient structure are now to be seen; but the present edifice was built on the same spot by pope Boniface IX. Gregory XIII. and Clement VIII. and at first consisted of two wings. It was completed by the same Clement, Innocent X., and Alexander VII. and is now a very magnificent palace. The roof of it is flat, and adorned with many statues of illustrious persons among the Romans. In the new building resides the senate of Rome, who daily administer justice there; and in the wings are the apartments of the conservators of the city. There is also room enough for keeping antiquities and other curiosities which the traveller of taste has always admired. The "Camera apostolica," or apostolic chamber, has now usurped the rights of the famous "Senatus Populusque Romanus." In the front of this building is a high tower, with the statue of religion erected on the top of it. The double flight of steps at the entrance of this palace is the work of Michael Angelo, who likewise adorned the front with a superb fountain, and two statues representing the Nile and the Danube in a reclining posture. In the centre is a porphyry statue of Rome, in the habit of Minerva, and the usual symbols of the helmet and spear, but sitting. This is a piece of great antiquity, and much admired by connoisseurs. The large hall, where the court of justice is held by the senators, was formerly adorned with several pictures, representing the achievements of the kings of the Romans; but none of them now remain; Clement XI. having, in 1712, supplied their places with a great number of designs, exhibiting the life of pope Pius V. and his canonization. Under the "Corps de Logis" is the capital prison. In the apartments of the conservators, in the left wing, are two celebrated statues of Julius Cæsar and Augustus, both antiques and of white marble. The former, as sovereign of the world, holds a globe in his hand; the latter, a rostrum or beak of a ship, alluding to his victory over Mark Antony and Cleopatra. Near these statues are to be seen two feet and a hand of oriental marble, being part of a colossus or statue of Apollo, which was 30 ells in height, and sent by Marcus Lucullus from Apollonia to Rome, where it was placed on the Capitoline mount. Opposite to this is the head of the Colossus. Here are also another large head and hand of brass, supposed to have belonged to a colossus of Commodus or Domitian. Near the inscription on Agrippina's monument is an admirable an-

cient groupe, representing a lion tearing to pieces a horse; but the horse is much damaged by time. This admired piece was found on the banks of the Tiber, near the Ostia gate, in the time of Paul III. Here is also a very remarkable piece of architecture, in which five pieces of sculpture are conjoined, which had originally no connection, and were dug up in different places. In the centre, and elevated above the rest, sits Rome triumphant, in white marble, with a poniard in her left, and a branch of palm in her right hand; and on the front of the base, on which she sits, is a woman in tears, representing Dacia, or some other conquered province. On each side of this statue is the colossus of a barbarian prince in a kind of black marble, called "basaltes." Their rank may be known by their diadems. The workmanship is exquisite; but it is not known who they are. Here is also the marble sarcophagus of the emperor Alexander Severus and his mother Julia Mamaea, found on Monte del Grano, near Fiescati, and brought hither. It is six feet long, and six broad. Not far from this is a marble colossal statue of Constantine the great, which shews that the art of sculpture was upon the decline, though the two muses are good pieces, as is also a priestess of Bacchus. Near the stairs is a very remarkable antique, viz. the "columna rostrata," which is of Parian marble; erected in the year of Rome 494, in honour of the consul Caius Duilius, on account of a naval victory, which he obtained over the Carthaginians. Near it is a basso-relievo, representing Curtius leaping into the abyss. At the first landing place are seen two antique muses; and a little farther, four admirable basso-relievos, representing the triumph of Marcus Aurelius and Lucius Verus, which belonged to their triumphal arch in the Corso. Before the entrance of the great hall is a large sturgeon, 6½ fms long, cut in white marble; the head of every fish of this species, exceeding that measure, being due to the conservators of the city. On the left hand are the Fasti consulares, down to the time of the emperor Pertinax, engraved on marble; and above these is a basso-relievo of the wolf suckling Romulus and Remus. Farther in are the names of the modern conservators. In the first hall are some passages of the Roman history, painted by Gioseppi d'Arpino; as, the rape of the Sabines, the combat betwixt the Horatii and Curatii, Romulus and Remus suckling the she-wolf, and the building of the city of Rome, &c. &c. But the most admired of all is the victory of Tullius Hostilius over the Veji and the Fidæates. There are various other marble statues and paintings in the different apartments, which it would exceed our limits to mention, but which must be highly gratifying to the curious.

From several remains of ancient walls, it is conjectured by some, that the temple of Jupiter Capitolinus stood on the ground which is at present inclosed in the court of the Caffarelli palace. The famous Tarpeian rock is now almost covered with buildings; but it is evident that anciently the rock must have been much steeper, or a wall must have been erected upon it, from which malefactors were thrown down headlong. That the height or depth of it has not undergone any considerable alteration may be concluded from Severus's triumphal arch at the foot of the Capitoline-hill, which, with the amphitheatre in its neighbourhood, is not above two or three feet below the present surface of the ground. See Keyser's Travels, vol. ii.

Anciently, the name capitol was likewise applied to all the principal temples, in most of the colonies throughout the Roman empire: as, at Constantinople, Jerusalem, Carthage, Ravenna, Capua, &c.

CAPITOLIA, or ÆLIA CAPITOLIA, in *Ancient Geography*, a name given to Jerusalem in the time of Ptolemy.

CAPITOLIAS, a town of Asia in Cœloſyria, N. of Adraa, according to Ptolemy; between Adraa and Gadara, according to the table of Peutinger; and in Antonine's route from Seriana to Scythopolis, between Neva and Gadara.

CAPITOLINE Games, *Ludi CAPITOLINI*, were annual games, or combats, instituted by Camillus, in honour of Jupiter Capitolinus; and in commemoration of the Capitol's not being surprised by the Gauls.

Plutarch tells us, that a part of the ceremony consisted in the public crier's putting up the Hetrurians to sale by auction: they also took an old man, tying a golden bulla to his neck, such as were worn by their children, and exposed him to the public derision. Festus says, they dressed him in a prætexta, and hung a bulla at his neck; not as accounting him a child, but because this was an ornament of the kings of Hetruria.

There was also another kind of capitoline games, called *agones capitolini*, instituted by Domitian, A.U.C. 839, A.D. 86, and celebrated each fifth year; wherein there were rewards and crowns, or garlands of oak-leaves, bestowed on the victorious poets, and put on their heads by the emperor himself. As the manner and plan of the capitoline games were taken more from the Greeks than from the Romans, Domitian presided in them, dressed after the Greek fashion, and wearing a crown of gold, in which were set the images of Jupiter, Juno, and Minerva. He was attended by the priest of Juno, and the college of priests, which he himself had instituted in honour of the Flavian family; all dressed like himself, except that they wore an image of the emperor in their crowns. If the crowns were given to superior merit, the exclusion of Statius, (*Capitolia nostræ inficiata lyræ, Silv. l. iii. v. 31.*) may do honour to the games of the Capitol; however, though he could not obtain the prize at these games, he was crowned three times at those of Minerva, in honour of whom Domitian celebrated a feast every year, in his house at Alba, with great pomp and magnificence. These games, which were not abolished in the 4th century, became so celebrated, that the manner of accounting time by lustres, which had obtained till then, was changed; and they began to count by capitoline games, as the Greeks did by olympiads. The feast was not for poets alone, but also for athletes, orators, historians, comedians, musicians, &c.

CAPITOLINE Marbles. See FASTI.

CAPITOLINI, in *Roman Antiquity*, a college of men residing in the capital and arx, to whom was committed the care of celebrating the capitoline games.

CAPITOLINUS, JULIUS, in *Biography*, a Latin historian, flourished at the close of the third, and beginning of the fourth century, and wrote the lives of the emperors Antoninus Pius, Verus, Albinus, Macrinus, the two Maximins, and the three Gordians. These are extant, but some other of his compositions are lost. His matter is chiefly copied from Herodian, and he is deemed neither a pure nor an exact writer. Voss. Hist. Latin.

CAPITOUL, or CAPITOL, an appellation given to the chief magistrates of Toulouse, who have the administration of justice and policy both civil and mercantile in the city.

The capitouls at Toulouse are much the same with the cchevins at Paris, and the consuls, bailiffs, burgher-masters, mayors, and aldermen, &c. in other cities. In ancient acts they are called *consules capitularii*, or *capitolini*, and their body *capitulum*. From this last come the words *capitularii* and *capitouls*. The appellation *capitolini* arose hence, that they have the charge and custody of the town-house, which was anciently called capitul.

The office only lasted one year, and ennobled the bearers. In some ancient acts they are called *capitulum nobilium Toulouse*. Those who have borne it, styled themselves afterwards burgessees. They were called to all general councils, and had the *jus imaginum*; that is, when the year of their administration expired, their pictures were drawn in the town-house; a custom which they retained from the ancient Romans, as may be seen in Sigonius.

CAPITOULATE, an appellation given to the several quarters or districts of the city of Toulouse, each under the direction of a CAPITOUL; much like the wards of London under their aldermen.

Toulouse is now divided into eight capitoulates, or quarters, which is subdivided into *moulans*, each of which has its tithing-man, whose business is to inform the capitoul of what passes in his tithing, and to inform the inhabitants of the tithing, of the orders of the capitoul. See TOULOUSE.

CAPITULA RURALIA, denote chapters held by the rural dean and clergy within the precincts of each deanery, anciently held every three weeks, then once a month, and more solemnly once a quarter.

CAPITULAR, or CAPITULARY, denotes an act passed in a chapter, either of knights, canons, or religious.

The capitularia, or capitulars of Charlemagne, Charles the Bald, &c. are the laws, both ecclesiastical and civil, made by those emperors in the general councils, or assemblies of the people: which was the way in which the constitutions of most of the ancient princes were made; each person present, though a plebeian, setting his hand to them.

Under the French monarchs of the first race, the general assemblies of the nation met annually at stated seasons, and extended their authority to every department of government. The power of electing kings, of making laws, of redressing grievances, of passing judgment in the last resort, with respect to every person and to every cause, and of conferring donations on the prince, resided in this great council of the nation. Under the second race of kings, notwithstanding the power and splendour which the conquests of Charlemagne added to the crown, the general assemblies of the nation continued to possess extensive authority. The right of determining which of the royal family should be placed on the throne, was vested in them. The princes elevated to that dignity were accustomed regularly to call and consult them with respect to every affair of importance to the state, and without their consent no law was passed, and no new tax was levied. These assemblies of the nation, distinguished by the name of *Conventus*, *Malli*, *Placita*, were regularly convened once a year at least, and frequently twice in the year. The nobles, the dignified ecclesiastics, and the great officers of the crown, were not the only members of the national council; the people, or the whole body of freemen, either in person, or by their representatives, had a right to be present in it. Montesquieu indeed, in his "Spirit of Laws," (vol. ii. p. 248), says, that under the first and second race, the nation was often assembled; that is, the lords and bishops; and that the commons were not yet thought on. But it appears from Hincmarus, archbishop of Rheims, and Agobardus, archbishop of Lyons, cited by Dr. Robertson, in his "History of Charles V." (vol. i. p. 438), that the people, as well as the members of higher dignity, formed a part of these assemblies, and participated in the legislative power. Thus, by a law, A.D. 803, it is ordained, "that the question shall be put to the people with respect to every new law, and if they shall agree to it, they shall confirm it by their signature." Capit. vol. i. 394. There are two capitularia, which convey to us a full idea of the part which the people had in the administration

tion of government. When they felt the weight of any grievance, they had a right to petition the sovereign for redress. One of these petitions is still extant: it is addressed to Charlemagne, A. D. 803, and expressed in such terms as could have been used only by men conscious of liberty, and of the extensive privileges which they possessed. They concluded with requiring him to grant their demand, if he wished that they should any longer continue faithful subjects to him. This great monarch made no remonstrance, but signified his willingness to comply; and sensible that he himself did not possess legislative authority, he promises to lay the matter before the next general assembly, that such things as were of common concern to all might be then considered and established by common consent. Capit. tom. i. p. 405—409. As the people by their petitions brought matters to be proposed in the general assembly, we learn from another capitular, the form in which they were approved there, and enacted as laws. The propositions were read aloud, and then the people were required to declare whether they assented to them or not. They signified their assent by exclaiming three times, "we are satisfied;" and then the capitulare was confirmed by the subscription of the monarch, the clergy, and the chief men of the laity. Capit. tom. i. p. 627. A. D. 822. From a capitulare of Carolus Calvus, A. D. 851, it seems probable, that the sovereign could not refuse his assent to what was proposed and established by his subjects in the general assembly. Tit. ix. §. 6. Capit. vol. ii. p. 47.

Some distinguish the capitulars from laws; and say, they were only supplements to laws.—They had their name, *capitulars*, from their being divided into *capitula*, chapters or sections. In these capitulars did the whole French jurisprudence anciently consist. In process of time, the name was changed for that of *ordonnances*.

The weakness of the greater part of the monarchs of the second race, and the disorder into which the nation was thrown by the depredations of the Normans, encouraged the barons to usurp an independent power formerly unknown in France. The political union of the kingdom was at an end, its ancient constitution was dissolved, and only a feudal relation subsisted between the king and his vassals. The regal jurisdiction extended no farther than the domains of the crown. Under the last kings of the second race, they were reduced almost to nothing. Under the first kings of the third race, they comprehended little more than the patrimonial estate of Hugh Capet, which he annexed to the crown. All these circumstances rendered it easy for the barons to usurp the rights of royalty within their own territories. Hence, the capitularia became no less obsolete than the ancient laws: local customs were every where introduced, and became the sole rule by which all civil transactions were conducted, and all causes were tried. The wonderful ignorance which became general in France, during the 9th and 10th centuries, contributed to the introduction of customary law. Few persons, except ecclesiastics, could read; and as it was not possible for them to have recourse to written laws, either as their guide in business, or their rule in administering justice; the customary law universally prevailed. Another circumstance that greatly contributed to the disuse of the capitularies, as well as of the Salic and Roman laws, was the great extent given at this time to judiciary combats. During this period, the general assembly of the nation seems not to have been called, nor to have once exerted its legislative authority. Local customs regulated and decided every thing. The last of the capitularia collected by M. Baluze, was issued in the year 921, by Charles the Simple. One hundred and thirty years elapsed from that period to the

publication of the first ordinance of the kings of the third race, contained in the great collection of M. Lauriere; and the first ordinance, which appears to be an act of legislation, extending to the whole kingdom, is that of Philip Augustus, A. D. 1190; and the ordinances previous to this reign, contain regulations, the authority of which did not extend beyond the king's domains. See ORDINANCE. Baron Montesquieu observes, (Sp. of Laws, vol. ii. p. 250.) that there were several sorts of capitularies. Some had relation to political government, others to economical, most of them to ecclesiastical polity, and some few to civil government. Those of the last species were added to the civil law, that is, to the personal laws of each nation; for which reason, it is said in the capitularies, that there is nothing stipulated therein contrary to the Roman law. In reality, those capitularies that regarded economical, ecclesiastical, or political government, had no relation to that law; and those concerning civil government had reference only to the laws of the barbarous people, which were explained, amended, enlarged, and retrenched. But the addition of these capitularies to the personal law, occasioned, as Montesquieu conceives, the neglect of the very body of the capitularies themselves: as in times of ignorance, the abridgment of a work often causes the loss of the work itself. Ansegise is said to have made the first collection of regulations contained in the capitulars of Charlemagne and Louis le Debonnaire; which collection is divided into four books, and has been approved by Louis le Debonnaire, and Charles the Bald. After him, Benoit collected, about the year 845, the capitulars of these two emperors, omitted by Ansegise, and annexed to them the capitulars of Carloman and Pepin. This collection is divided into three books, which comprehend, with the four preceding, the seven books of the capitulars of the French kings: the six first of these were published by du Tillet in 1548, and the whole collection of seven books by M. M. Pithou. Father Sirmond has published some capitulars of Charles the Bald; and at length, M. Baluze printed a complete edition of the capitulars in 2 vols. fol. at Paris in 1677. This contains the capitulars of the French kings, and the collections of Ansegise and Benoit, together with some other pieces.

The bishops also in the 8th and following centuries gave the name of capitula and capitulars to the regulations which they enacted in their synodal assemblies, with regard to ecclesiastical discipline, deducing them from the canons of councils, and the works of the fathers. These regulations had the force of laws only in the diocese of the prelate who published them, unless they were approved by a council, or the metropolitan; in which case, they were observed through the whole province. Of this kind are the collections of Martin, archbishop of Braga, in the year 525; those of pope Adrian I., given to Angilram, or Enguerran, bishop of Metz, in 785; those of Theodulphus, bishop of Orleans, in 767; those of Hincmar, archbishop of Rheims, in 852; those of Herard, archbishop of Tours, in 858; and those of Isaac, bishop of Langres. Doujat, Hist. du Droit canon. Baluze, Præf. ad Capit. M. du Pin. Eccl. Ant. of the 8th century.

CAPITULATION, in *Military Language*, a particular convention, agreement, compact, or treaty between two powers. Thus, one power makes a capitulation with another to furnish him with troops on condition of subsistence, pay, and certain privileges, or for other military succours or assistance. A corps or body of troops constrained to surrender themselves makes a capitulation with that, which forces it to do so. A governor or commandant of a place besieged enters into a capitulation with the general of the

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besieging army when he is under the necessity of delivering it up.

The surrender of a place by capitulation is justifiable and honourable, or otherwise, in proportion to the ability, skill, perseverance, and valour, with which it has been defended.

Many governors trusting too much to their courage and the vigour of their arms are negligent in making themselves acquainted with, and practising the means of enabling them to defend the places entrusted to their care as long and obstinately as possible, and to the best advantage. This knowledge, however, is of the first importance, and highly estimable. They think they fulfil and discharge their duty sufficiently if they expose their own lives on all occasions, either offering themselves or fought for. The examples of several places, which, though taken through want of good conduct, have nevertheless been defended with a considerable degree of valour and éclat, are apt to lead them into this error. But they would have no reason to dread the blame that might attach to their surrendering sooner than they ought, were they to add to their valour that knowledge of defence, which they but too often neglect to acquire.

They believe, that when their outworks are taken, and the miner is attached to the body of the place, or at the most, if the bastion be at all opened, or a breach made in it, they may surrender and capitulate with honour after appearing sword in hand on the top of the breach at the head of a battalion, that does not fight but only faces the fire of the cannon and musquetry of the attack, and then retires from the breach behind some trifling and weak retrenchment, that appears to have been made more for the capitulation of the troops than for the defence of the place. Such prompt capitulations are sometimes occasioned and brought about by the reasonings and importunity of the other officers, who urged by self-interest wish to preserve the little baggage and effects that belong to them, and preferring the preservation of them to their real glory, persuade the governor, who for particular reasons of his own wishes also perhaps to be persuaded, that he may capitulate with honour; that it is much better to secure by a voluntary treaty the liberty of the inhabitants and to march out drums beating, colours flying, arms loaded, *balle en bouche* to reload them with, matches lighted, and with some pieces of cannon, their baggage and effects, than to await an approaching extremity and to run the risk of being stormed or having the place carried by force. They represent to him, that one part of the soldiers are wounded, that others are sick, and that those, who are still in a condition for service, are discouraged and disheartened; that their long watchings, their severe fatigues and sufferings, well entitle them to his most serious attention to their safety and preservation. By urging these and many such other bad reasons, they endeavour to make him form the resolution, which he has himself perhaps already taken, of capitulating, and of which he is probably well pleased in his own mind, that they have made him the overture or proposal, since, after some formalities, he concludes with them on surrendering up the place; as if a bastion, that is not perhaps bared or stripped of its revetement in more than one spot, furnished a free and easy entrance to the enemy, or as if the state to which the place belongs had gone to the expense of erecting the works and revetting the ramparts for no other purpose than that of procuring such a capitulation, as troops often make in small and bad redoubts, and sometimes in the open field. Such conduct is base and dishonourable, and such ideas are grafted on ignorance of the proper method of defending works by means of retrenchments one after another, which is not only possible but

practicable; and every governor or commandant, that understands and does his duty, will put in practice.

Many and numerous, indeed, are the contrivances for rendering the defence of a fortified place long and ruinous to the besieger, if the governor and other officers of it were better instructed in their duty than they commonly are, and would sacrifice their interest to their glory and the good of their country. The governor or commandant of such a place, besides doing the utmost in his power to have it at all times supplied with a sufficiency of troops, provisions, artillery, ammunition, medicines, and every thing else, that is necessary for the support and comfort of the garrison in order to enable him to defend it properly and stand a siege, he should before it is invested or even expected to be besieged, take care that there are no ditches, fences, buildings, or any thing else within cannon-shot of the glacis or covert way, that can serve to cover the enemy from his view, or shelter them in opening their trenches. He should have every ditch filled up, every fence and tree cut down, and even every little eminence or rising ground within that distance levelled if possible. Many of the governors, however, and principal officers of such places act in time of peace as if they supposed they were never to be invested, and totally neglect their environs. They permit the inhabitants to make gardens, to surround these with ditches and fences, to plant trees, and even to erect buildings within cannon-shot of their works; and the moment an enemy appears before the same they are often so ignorant of their duty as to attempt to cannonade him and to throw their shot at him to as great a distance as they are able, as if they wished to facilitate his enterprise or to aid and assist him in the execution of his design by pointing out to him the very ground where he ought to form his encampment, and the distance at which he should open his trenches and commence the attack. The besieged, however, remaining quiet instead of pursuing such injudicious conduct, is usually attended with one or other of the two following advantageous circumstances; namely, that the besiegers fix their camp either too near to the place, or farther from it than is necessary. If it be too far off, the line of circumvallation becomes too extensive, and is of course less calculated than it otherwise might be for preventing succours from getting into the place. And if, on the other hand, it be too near, the besiegers after some days when the cannon of the place begin to fire on them will be obliged to move it farther off; by which means the line of circumvallation must be commenced anew, and their time and labour will be lost, which, at the beginning of a siege, is all that the besieged can expect or desire.

As it is customary for the enemy a day or two after the opening of the trenches and sometimes on the very same day to advance in order to reconnoitre the places most convenient or commodious for the attack, and as this reconnoitring is often performed by the general of the besieging army himself, that he may know what resolution to take respecting it; the governor or commandant of the place should take particular care that none of his people are made prisoners. For even the most ignorant of them might furnish useful intelligence to the enemy.

When the besieging army is weak he may send out a large body of troops to keep them at a distance by means of musquetry. But when it is strong, he should not leave without the place, but a small number of cavalry or infantry, with directions by a feigned retreat to draw the enemy into a situation that will expose them to the fire of the works if they attempt to approach and charge them.

The governor or commandant of a fortified place should know how to counteract and protract the operations of the besiegers

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besiegers by means of counter-approaches, by forties or sallies, by mines, &c. ; all which he ought to make use of and put in practice, disputing every inch of ground, as well as various contrivances for rendering breaches impracticable after they appear to be practicable to the enemy, before he seriously thinks of capitulating. Before the place, intrusted to his care, is actually attacked, he should frequently weigh and ponder in his own mind every possible or practicable method of attacking it, that he can imagine or conceive, and then endeavour to find out as many different sorts of defence for counteracting and prolonging them. Such mental reflection and examination would render it almost impossible for any occurrence to take place during a siege, that he had not already thought of, or that did not at least bear some resemblance to what he had thought of, and would enable him to draw from this likeness or similitude prompt resources and expedients.

The articles of capitulation are proposed by the governor or commandant of the place besieged, who receives hostages for the safety and security of those, whom he sends to the general of the enemy. It is customary to give hostages of equal rank reciprocally.

The stipulation of the articles proposed, the alteration, modification, or refusal of some of them, is governed by a variety of considerations depending on the views and knowledge or information of the general, who conducts the siege.

When the articles are signed, the besiegers take possession of some post, or of a front attacked, according as it is agreed on.

When the time arrives, at which the garrison is to march out, it is usual to introduce into the place by way of honour and distinction the oldest corps of the army of the besiegers, which occupies posts for guarding it; and after the besieged have left it, those corps are marched into it, that are intended to garrison it.

The examination of the artillery, ammunition, stores, and provisions, that ought to remain in the place agreeably to the capitulation, precedes the going out of the garrison which is always done in concert by the officers of artillery, store-keepers, and commissaries, who exchange signed accounts, or statements and discharges, from which the general gives orders for providing the place with what is wanted.

The troops, that march out, receive an escort sufficient for conducting them safe to the place appointed by the capitulation; an article, which of all others is in general most religiously observed.

After the marching out of the garrison, the first object of attention is the levelling and destruction of the works that were erected or thrown up for the attack of the place, and the repairing of all those, that were injured or damaged by the same. The besieging army, indeed, ought not to quit their lines after the place capitulates till they have filled them up, and either removed their heavy artillery into the place, or sent it elsewhere with whatever is not necessary for its defence. Then they may leave them either for the repose and refreshment of the troops fatigued with the siege, or for the convenience of subsistence, or to execute the remaining part of the plan of the campaign.

When the governor or commandant of a fortified place, after having made every practicable preparation for, and exhausting all his means of defence, is reduced to the necessity of capitulating, in order to obtain as favourable conditions as he possibly can both for his garrison and for the inhabitants, he orders one or more drummers to repair to that part of the rampart, which is next to the attack, and to give notice to the besiegers, by beating the *chamade*, that he has some

proposals to make. For the same purpose one or more white colours are set up on the rampart, and one of them remains either on it or on the breach during the negotiation. The same formality is observed, when after a violent attack a suspension of arms is demanded, either for the purpose of burying the dead or for carrying off the wounded.

After the beating of the *chamade*, the governor or commandant sends some officers of distinction to the commander in chief of the besiegers to deliver to him the conditions, on which he proposes to surrender up the town, place, or city. As a security, however, for the officers sent from the garrison, the besiegers send an equal number generally of the same rank into the place. When the governor's proposals are not satisfactory to the general of the besieging army, he on his part prescribes the conditions, on which he expects it to surrender, commonly threatening to allow the governor no terms whatsoever in case he do not accede to those prescribed within a certain time, or before such or such a work shall be finished. If the besieged find the terms or conditions insisted on by the besiegers to be too hard or rigorous, the officers sent to them return to the besieging army, and those sent by them return into the garrison. The drummers are directed to beat their drums upon the rampart, that every one may have timely notice to retire before hostilities recommence, which they do very soon afterwards. During the negotiation or suspension of arms no work ought to be erected or even repaired, either by the besieged or by the besiegers. It is necessary, however, to be on the watch at that time as much as at any other, and strictly to guard every point liable to be attacked, to prevent any surprises by stratagem, which are regarded as warrantable and lawful.

But if the terms or conditions of the capitulation be agreed on, the governor or commandant sends two or three of his principal officers into the camp, and the besieging general sends the same number of officers of equal rank into the place, as a security for its accomplishment. When the besieged have performed every thing agreeably to the compact or treaty, their hostages are sent back to them, as are those of the besiegers as soon as the terms, they agreed to, are complied with.

The terms or conditions of a capitulation vary with circumstances and situations; but they are generally to the following purport.

1. The garrison shall march out through the breach with their arms, baggage, horses, drums beating, matches lighted at both ends, *balle en bouche*, colours flying, a certain number of pieces of cannon and mortars, with their appurtenances, spare carriages, ammunition for a certain number of charges; to be conducted in safety by the *shortest road*, or by a specific route, to the nearest town or place belonging to the besieged, and if the distance be so great as to require a march of several days, to be provided with provisions and lodgings during that time.

2. That one of the gates shall be delivered up to the besiegers the evening of the day on which the capitulation or convention is signed, or at a certain hour next day, and that the garrison shall march out a day or two after, according to agreement.

3. The besiegers shall furnish a certain number of covered waggons, which are not to be searched, besides others for carrying the wounded and sick that are in a condition to be transported, and in general all the carriages and horses necessary for removing the garrison's baggage, and the artillery allowed by the capitulation.

4. That the sick and wounded who cannot be removed or carried off, and are obliged to be left behind in the place, shall

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shall have free liberty to go away, with every thing that belongs to them, when they are in a condition to do so; and they shall in the mean time be furnished with lodgings, and with provisions, *gratis*, or *otherwise*, and have every sort of medical aid or assistance that can well be afforded to them.

5. There shall be no indemnification required from the besieged for any horses taken from the inhabitants, or for any houses burnt or destroyed during the siege.

6. The governor or commandant, the officers under him, and those belonging to the garrison, the garrison itself, and in general every one in the king's, prince's, or state's service, shall freely quit the place without reprisals of any kind.

7. That the inhabitants shall exercise their religion according to their accustomed forms of worship, without hindrance or molestation.

8. The inhabitants, both of the place and its dependencies, shall be maintained in all their rights, privileges, and prerogatives.

9. Those that choose to leave the place shall have free liberty to go whither they please with their effects; and such of the inhabitants as have shewn a partiality to the garrison, or assisted them during the siege, shall not be molested on that account.

10. All the remaining powder and ammunition shall be delivered up to the besiegers, and the loaded mines shall be shewn and pointed out to them.

11. All the prisoners made on both sides during the siege shall be released.

A garrison should have a sufficiency of provisions and ammunition to last for three days to entitle them to a convention or capitulation. But if they have not near so much of either, at the signing of the capitulation, they cannot in justice be afterwards regarded as prisoners of war, because the besiegers were not at the time acquainted with the circumstance.

If the besiegers will not agree to any other stipulation than the besieged's being made prisoners of war, and the garrison is not in a condition to hold out any longer, it is generally endeavoured to render the conditions as little burthenome and rigorous as possible; such, for instance, as the following:

1. That the governor or commandant, and the principal officers, shall keep their swords, pistols, baggage, &c.

2. That the subalterns shall keep their swords and baggage.

3. That the common men shall not be rifled or dispersed about from their regiments.

4. That the garrison shall be conducted by the shortest road to a certain place, and there remain prisoners of war.

5. That the principal officers shall have leave for a few days to go where they please to settle their affairs.

6. When the garrison quits the place, no attempts shall be made to debauch the soldiers, or to encourage them to desert from their regiments.

When the capitulation is settled and signed, an officer of artillery from the besiegers comes into the place, who, with an officer of artillery from the garrison, takes an inventory of all the ordnance and ammunition in it; and commissaries, in like manner, take an account of all the provisions.

The besieged may destroy magazines before, but not after they have made any proposition for a capitulation.

When the day arrives on which the garrison is to leave the place, the army of the besiegers is put under arms, and ranged in two files, between which the garrison marches. The general and the principal officers head the two files, to see the garrison file before them.

The governor or commandant marches at the head, followed by the principal officers, who make the garrison march in as good order as possible. The oldest regiments are commonly in the van and in the rear, and the others, with the baggage, in the centre. When there are any horse or cavalry, they are also divided into three bodies, to march as the van, centre, and rear. Small detachments of horse and foot are made to march at the sides of the baggage, to prevent its being rifled.

The artillery allowed by the capitulation march after the first battalion.

When the garrison arrives at the place agreed on, the governor gives up the hostages of the besiegers to the escort; and when the escort reaches the army, the hostages left by the besieged for the security of the escort, carriages, and other things allowed to them, are released.

When the garrison are made prisoners of war, they are in like manner escorted to the place agreed on.

Every thing stipulated or agreed upon in a capitulation should be held sacred and inviolable, and ought to be religiously observed. For when the king grants and signs a capitulation by his general, he acts in the same capacity as when he enters into and concludes a treaty of peace by his ambassador; in either case he acts as the procurator or agent of the community at large, as the constitutional representative of parliament and the nation, and every such act of his is equally binding on both. It is evident that parliament thought so when it passed the act that established the church of Rome at Quebec and in Canada, and was convinced that it could not constitutionally violate the stipulations made in favour of that religion in the capitulation entered into by general Amherst and the marquis de Vandreuil.

When the surrendering place or city has a citadel, it should be stipulated that the garrison shall have a certain time allowed them for retiring into the citadel with what they want; that the sick and wounded, who are not in a situation to be removed, shall remain in their lodgings in the place till they are cured or get well, when they are to be furnished with carriages and passports to retire to some place agreed on; that none are to be admitted into the citadel that cannot be useful in assisting to defend it; and that the besiegers shall not erect any work or works whatsoever for the purpose of carrying on approaches against the same during the time prescribed.

If the operations, either of the besieged or besiegers, be carried on in conjunction with confederates or allies, stipulations ought to be made on and in their behalf; and if they be principals as well as the besiegers, they should be parties to the capitulation.

If the place be a maritime town, with a harbour or harbours, and shipping in them, belonging either to the besieged or to their allies, or other nations, terms or conditions respecting these should be expressly inserted in the body of the treaty or convention.

If the besieged be in a place that is situate in a country distant from their own, to which they cannot return but by water, and have no other strong hold in that country for them to retire to, they should take care to have it stipulated in the capitulation that the besiegers shall furnish them with transports, provisions, and a sufficient convoy, and carry them to the nearest port or ports in their own country.

As the capitulation agreed to and signed by lord Keith, lord Hutchinson, Husein capitan pacha, and general Menon, at Alexandria the 30th August 1801, comprises as great a diversity of the foregoing specified conditions or stipulations as any other that we know of, we will conclude this article by inserting it as a very good specimen, form, or model.

Articles

CAPITULATION.

Articles of the Capitulation proposed by Abdoullah Jacques Francois Menou, General in Chief of the French Army now in Alexandria, to the Generals commanding the Land and Sea Forces of His Britannic Majesty, and of the Sublime Porte, forming the Blockade of Alexandria, dated the 12th Fructidor, Year Nine of the French Republic, (30th of August, 1801.)

Art. 1. From the present date to the 30th Fructidor (17th of September, 1801), there shall be a continuation of the truce and suspension of arms between the French army, and the combined armies of his Britannic majesty and of the Sublime Porte, upon the same conditions with those which actually subsist, with the exception of a regulation to be amicably settled between the respective generals of the two armies, for establishing a new line of advanced posts, in order to remove all pretext of hostility between the troops.

Answer. Refused.

Art. 2. In case no adequate succour should arrive to the French army before the day mentioned in the preceding article, that army shall evacuate the forts and entrenched camps of Alexandria upon the following conditions.

Answer. Refused.

Art. 3. The French army shall retire, on the first complementary day of the French era, into the city of Alexandria, and forts adjacent, and shall deliver up to the allied powers the entrenched camp in front of the lines of the Arabs, the Fort le Turc, and the Fort du Vivier, together with their artillery and ammunition.

Answer. In forty-eight hours after the signing of the capitulation, namely, on the 2d of September, at noon, the entrenched camp, the Fort Turc, and that of du Vivier, shall be delivered up to the allied powers. The ammunition and artillery of these forts shall be also delivered up. The French troops shall evacuate the city, forts, and dependencies of Alexandria ten days after signing the capitulation, or at the time of their embarkation.

Art. 4. All individuals, constituting a part of the French army, or attached to it by any relations, civil or military, the auxiliary troops of every nation, country, or religion, of whatever powers they might have been subjects before the arrival of the French, shall preserve their property of every description, their effects, papers, &c. &c. which shall not be subject to any examination.

Answer. Granted; provided that nothing be carried away belonging to the government of the French republic; but only the effects, baggage, and other articles belonging to the French and auxiliary soldiers who have served during six months in the army of the republic; the same is to be understood of all the individuals attached to the French army, by civil or military capacities, of whatever nation, country, or religion they may be.

Art. 5. The French forces, the auxiliary troops, and all the individuals described in the preceding article, shall be embarked in the ports of Alexandria, between the 5th and the 10th of Vendemaire, year ten of the republic, at the latest (27th of September to the 3d of October, 1801), together with their arms, stores, baggage, effects, and property of all kinds, official papers, and deposits, one field piece to each battalion and squadron, with ammunition, &c. &c. the whole to be conveyed to one of the ports of the French republic in the Mediterranean, to be determined by the general in chief of the French army.

Answer. The French forces, the auxiliary troops, and all the individuals described in the 4th article, shall be embarked in the ports of Alexandria (unless after an amicable

convention it should be found more expeditious to embark a part of them at Aboukir), as soon as vessels can be prepared, the allied powers at the same time engaging that the embarkation shall take place, if possible, ten days after the capitulation shall be signed; they shall receive all the honours of war, shall carry away their arms and baggage, shall not be prisoners of war, and shall moreover take with them ten pieces of cannon, from four to eight pounders, with ten rounds of shot to each gun; they shall be conveyed to a French port in the Mediterranean.

Art. 6. The French ships of war, with their full complement, and all merchant ships, to whatever nation or individuals they may belong, even those of nations at war with the allied powers, or those that are the property of owners or merchants, who were subjects of the allied powers before the arrival of the French, shall depart with the French army, in order that those that are ships of war may be restored to the French government, and the merchant ships to their owners, or to their assignees.

Answer. Refused. All vessels shall be delivered up as they are.

Art. 7. Every single ship that, from the present day to the 30th Fructidor, shall arrive from the French republic, or any of her allies, into the ports or roads of Alexandria, shall be comprehended in this capitulation. Every ship of war or commerce, belonging to France, or to the allies of the Republic, that shall arrive in the port or road of Alexandria within the twenty days immediately following the evacuation of that place, shall not be considered as lawful prize, but shall be set at liberty, with her equipage and cargo, and be furnished with a passport from the allied powers.

Answer. Refused.

Art. 8. The French and auxiliary troops, the civil and military agents, attached to the army, and all other individuals described in the preceding articles, shall be embarked on board some French or other vessels, actually in the ports of Alexandria, as shall be in a condition to go to sea, or on board those of his Britannic majesty, and of the Sublime Porte, within the time fixed by the 5th article.

Art. 9. Commissioners shall be named by each party to regulate the number of vessels to be employed, the number of men to be embarked upon them, and generally to provide for all the difficulties that may arise in carrying into execution the present capitulation. Those commissioners shall agree upon the different positions which shall be taken by the ships now in the port of Alexandria, and those which shall be furnished by the allied powers, so that by a well-regulated arrangement, every occasion of difference between the crews of the several nations may be avoided.

Answer. All these details will be regulated by the English admiral, and by an officer of the French navy, named by the general in chief.

Art. 10. Merchants and owners of ships, of whatever nation or religion they may be, and also the inhabitants of Egypt, and of every other country, who may at the present time be in Alexandria, whether Syrians, Copts, Greeks, Arabs, Jews, &c. and who shall be desirous of following the French army, shall be embarked with, and enjoy the same advantage with that army; they shall be at liberty to remove their property of all kinds, and to leave power for the disposal of what they may not be able to take away. All arrangements, all sales, all stipulations, whether of commerce or of any other nature made by them, shall be strictly carried into effect after their departure, and be maintained by the generals of his Britannic majesty, and of the Sublime Porte. Those who may prefer remaining in Egypt a certain

CAPITULATION.

certain time, on account of their private affairs, shall be at liberty so to do, and shall have full protection from the allied powers; those also who may be desirous of establishing themselves in Egypt, shall be entitled to all the privileges and rights of which they were in possession before the arrival of the French.

Answer. Every article of merchandize, whether in the town of Alexandria, or on board the vessels that are in the ports, shall be provisionally at the disposition of the allied powers; but subject to such definitive regulation as may be determined by established usage, and the law of nations. Private merchants shall be at liberty to follow the French army, or they may remain in the country in security.

Art. 11. None of the inhabitants of Egypt, or of any other nation or religion, shall be called to account for their conduct during the period of the French troops having been in the country, particularly for having taken arms in their favour, or having been employed by them.

Answer. Granted.

Art. 12. The troops, and all others who may be embarked with them, shall be fed during their passage, and until their arrival in France, at the expence of the allied powers, and conformably to the rules of the French navy. The allied powers shall supply every thing that may be necessary for the embarkation.

Answer. The troops, and all others who may be embarked with them, shall be fed during their passage, and until their arrival in France, at the expence of the allied powers, according to the usage established in the marine of England.

Art. 13. The consuls and all other public agents, of the several powers in alliance with the French republic, shall continue in the enjoyment of all the privileges and rights which are granted by civilized nations to diplomatic agents. Their property, all their effects and papers, shall be respected, and placed under the protection of the allied powers: they shall be at liberty to retire or to remain, as they may think fit.

Answer. The consuls and all other public agents of the powers in alliance with the French republic, shall be at liberty to remain or to retire, as they may judge fit. Their property and effects of any kind, together with their papers, shall be preserved for them, provided they conduct themselves with loyalty, and conformably to the law of nations.

Art. 14. The sick who may be judged by the medical staff of the army to be in a state for removal, shall be embarked at the same time with the army, upon hospital ships properly furnished with medicines, provisions, and every other store that may be necessary for their situation; and they shall be attended with French surgeons. Those of the sick who may not be in a condition to undertake the voyage, shall be delivered over to the care and humanity of the allied powers. French physicians and other medical assistance shall be left for their care, to be maintained at the expence of the allied powers, who shall send them to France as soon as their state of health will permit, together with any thing belonging to them, in the same manner as has been proposed for the rest of the army.

Answer. Granted. The ships destined for hospitals shall be prepared for the reception of those who may fall sick during the passage. The medical staff of the two armies shall concert together in what manner to dispose of those of the sick, who, having contagious disorders, ought not to have communication with the others.

Art. 15. Horse transports for conveying sixty horses, with every thing necessary for their subsistence during the passage, shall be furnished.

Answer. Granted.

Art. 16. The individuals composing the Institute of Egypt, and the commission of arts, shall carry with them all the papers, plans, memoirs, collections of natural history, and all the monuments of art and antiquity, collected by them in Egypt.

Answer. The members of the Institute may carry with them all the instruments of arts and science, which they have brought from France; but the Arabian manuscripts, the statues, and other collections which have been made for the French republic, shall be considered as public property, and subject to the disposal of the generals of the combined army.

General Hope having declared, in consequence of some observations of the commander in chief of the French army, that he could make no alteration in this article, it has been agreed that a reference thereupon should be made to the commander in chief of the combined army.

Art. 17. The vessels which shall be employed in conveying the French and auxiliary army, as well as the different persons who shall accompany it, shall be escorted by ships of war belonging to the allied powers, who formally engage that they shall not in any manner, be molested during their voyage; the safety of such of these vessels as may be separated by stress of weather, or other accidents, shall be guaranteed by the generals of the allied powers; the vessels conveying the French army shall not, under any pretence, touch at any other than the French coast, except in case of absolute necessity.

Answer. Granted. The commander in chief of the French army entering into a reciprocal engagement that none of these vessels shall be molested during their stay in France, or on their return; he equally engaging that they shall be furnished with every thing which may be necessary, according to the constant practice of European powers.

Art. 18. At the time of giving up the camps and forts according to the terms of the third article, the prisoners in Egypt shall be respectively given up on both sides.

Answer. Granted.

Art. 19. Commissioners shall be named to receive the artillery of the place and of the forts, stores, magazines, plans, and other articles that the French leave to the allied powers; and lists and inventories shall be made out, signed by the commissaries of the different powers, according as the forts and magazines shall be given up to the allied powers.

Answer. Granted. Provided that all the plans of the city and forts of Alexandria, as well as all maps of the country, shall be delivered up to the English commissary. The batteries, cisterns, and other public buildings, shall also be given up in the condition in which they actually are.

Art. 20. A passport shall be granted to a French armed vessel, in order to convey to Toulon, immediately after the camps and forts before-mentioned shall be given up, officers charged by the commander in chief to carry to his government the present capitulation.

Answer. Granted. But if it is a French vessel it shall not be armed.

Art. 21. On giving up the camps and forts mentioned in the preceding articles, hostages shall be given on both sides, in order to guarantee the execution of the present treaty. They shall be chosen from among the officers of rank in the respective armies: namely, four from the French army, two from the British troops, and two from the troops of the Sublime Porte. The four French hostages shall be embarked on board the English ship, commanding the squadron; and the four British and Turkish hostages on board

board one of the vessels which shall carry the commander in chief, or the lieutenant generals. They shall all be reciprocally delivered up on their arrival in France.

Answer. There shall be placed in the hands of the commander in chief of the French army, four officers of rank as hostages: namely, one officer of the navy, one officer of the British army, and two officers of the Turkish army. The commander in chief shall, in like manner, place in the hands of the commander in chief of the British army four officers of rank. The hostages shall be restored on both sides at the period of the embarkation.

Art. 22. If any difficulties should arise during the execution of the present capitulation, they shall be amicably settled by the commissaries of the armies.

Answer. Granted.

(Signed) KEITH, Admiral.

J. HELY HUTCHINSON, Lieutenant General, Commander in Chief.

HUSSIM, Capitan Pacha.

ABDOULLAH JACQUES FRANCOIS MENOU, General in Chief of the French Army.

JAMES KEMPT, Lieutenant Colonel and Secretary.

CAPITULATION denotes also a kind of treaty, *pacta conventa*, or original contract, drawn up by the electors, in the name of the princes and states of the empire, before the election of an emperor; which the emperor is to ratify before his coronation; and to observe inviolable in the course of his reign.

The imperial capitulations have only been obtained since the time of Charles V. before which time the ordinary constitutions of the empire served in lieu of these capitulations. They were occasioned by the jealousy the German princes had entertained of the too great power of the emperor. Frederic, duke of Saxony, surnamed the Wise, passes for the author of the imperial capitulation; who, declining the empire, which was offered him after the death of Maximilian, advised the electors to choose Charles V. under such conditions as might secure the liberty of the empire. The design of the capitulation is, on the one hand, to prevent the emperor from abusing his power to the oppression of the people; and, on the other, to prevent the people from breaking in on the just rights of the emperor. And the principal points which the emperor undertakes to observe are the defence of the church and empire, an observance of the fundamental laws of the empire, and a maintenance and preservation of the rights, privileges, and immunities of the electors, princes, and other states of the empire, specified in the capitulation. The imperial capitulations are considered as fundamental laws of the empire; and though the drawing up, presenting, procuring the signature, and taking care of the execution of them, be committed to the electors, they are reputed the act of the states of the empire.

The king of the Romans also, when elected, signs the emperor's capitulation, as being in right of such election to succeed to the empire after the death of the emperor.

CAPITULUM, in *Anatomy*, a little head, especially of a bone, answering to the Greek *condylus*.

CAPITULUM, in *Botany*, the head, or compound flower of any plant; being composed of many leaves and threads or stamina, closely connected in a globose, circular or discous figure; as the flowers of bluebottles, scabious, carduus, &c.

CAPITULUM, in *Ancient Geography*, a town of Italy, situated in the mountains above Preneste, in the country of the Hernici, according to Strabo. Pliny calls it "Capitolium Hernicum," and Frontinus "Capitolium," and says that it received a colony conformably to the law of Sylla.

CAPITULUM, in the *Ancient Military Art*, was a transverse beam, wherein were holes through which passed the strings whereby the arms of huge engines, as ballistæ, catapultæ, and scorpions, were played or worked. Vitruv. de Arch. lib. i. cap. i.

CAPITULUM, in *Ecclesiastical Writers*, denoted part of a chapter of the Bible read and explained.

In which sense they said, *ire ad capitulum*, to go to such a lecture. Afterwards the place or apartment where such theological exercises were performed, was denominated *domus capituli*.

CAPITURIA, in *Ancient Geography*, a town of Thræce, situate in the country of mount Rhodope. Procopius.

CAPIVACCIO, JEROM, in *Medical Biography*, a native of Padua, where he arrived at the highest honours of his profession. In what year he was born is not known, but probably about 1525. In 1552, having passed through the usual degrees, he was made professor in medicine, an office he continued to hold with credit upwards of 30 years, his lectures being always numerously attended. He was also in great request as a practitioner, and particularly famed for his skill in curing the lues venerea, by which he is said to have amassed a very large property. This accounts for his refusing to remove to Pisa, though invited thither by the offer of a large salary by the grand duke of Tuscany. He wrote on every branch of medicine; and, as most of his works passed through several editions, we may suppose not unskilfully, though they are now generally superseded by newer opinions. He died in 1589. The titles of the principal of his works are, "De Lue Venerea Acroasæ," Spiræ, 1590. Francf. 1594, 8vo. He usually began the cure with giving the decoction of guaiacum and sarsaparill; those not succeeding, he had recourse to mercurial inunction. "Methodus Practicæ Medicinæ, omnium Corporis Humani Adfectuum Causas, Signa, et Curationes exhibens," Ven. 1591, fol. "Methodus Anatomica, five Ars Consecandi," edited by Teucer, with a dissertation in praise of anatomy. A compendium, containing descriptions of all the parts of the body, taken from Galen. Venet. 1593. Also, "De Fætus Formatione, De Signis Virginitatis, de Urinis," &c. These, with several other smaller pieces, were collected and published together under the title of "Opera Omnia," fol. Venet. 1597, reprinted 1601-3, 6, and 17. Astruc De Morb. Ven. Douglas Bib. and Haller Bib. Med. Anat. et Chirurg.

A malignant and fatal fever raging at Venice in 1576, Capi Vaccio was sent for to give his assistance in repressing it. But his endeavours not proving successful, and having unfortunately on his arrival declared the fever not to be contagious, he was sent away in disgrace. More than 100,000 of the inhabitants are said to have been swept off by the fever.

CAPIVARD, in *Zoology*. See CAPYBARA.

CAPIVI. See BALSAM.

CAPNELÆON, from καπνός, *smoke*, and ελαιον, *oil*, among *Ancient Naturalists*, denotes a species of resin, which flows spontaneously, being warmer, thinner, and more fluid than all other sorts of resins, so as nearly to approach the nature of oil, and evaporating plentifully on being exposed to the fire; whence the denomination, which imports as much as smoaking oil. It is sometimes also called *pissanthos*, or flower of pitch.

CAPNIA, in *Botany*, (from καπνός, *smoke*), a genus formed by Venterat for the umbilicated lichens of Linæus.

CAPNICON, in *Antiquity*, chimney-money, or a tax which

which the Roman emperors levied for smoke, and which of consequence was due from all, even the poorest, who kept a fire. This was first invented by Nicephorus.

CAPNIO, in *Biography*. See REUCHLIN.

CAPNISTON, among *Ancient Physicians*, denotes oil whose fumes, rendered aromatic by burning spices, are conveyed to a part affected.

CAPNITIS, or CAPNITAS *Jaspis*, in the *Natural History of the Ancients*, the name of a species of chalcedony, of a brownish ground, clouded with a large mist of blackish, looking like a column of smoke. The ancients also called our common chalcedony a jasper, not allotting any peculiar general name to these misty stones; and the name they gave this species very happily expressed its character, because it looks exactly as if obscured by a cloud of thick smoke. It is very common in the East Indies, and is sometimes found in Germany and France, but is seldom worked into any thing better than knife-hafts. See CHALCEDONY.

CAPNOIDES, in *Botany*. (Tourn. and Gærtner.) See FUMARIA, CAPNOIDES, and LUTEA.

CAPNOMANCY, a kind of divination by means of smoke, used by the ancients in their sacrifices. The word comes from *καπνος*, smoke, and *μαντεια*, divination. The general rule was, when the smoke was thin and light, and rose straight up, it was a good omen; if the contrary, it was an ill one.

There was also another species of capnomancy, consisting in the observation of the smoke rising from poppy and jessamin-seeds cast upon light coals.

CAPNOPHYLLUM, in *Botany*, a genus formed by Gærtner for the *Conium Africanum* of Linnæus, with the following character. Umbel compound, consisting of few rays; lateral rays of the partial umbel barren; central one very short, fertile. Involucres very short, each consisting of about three leaves. Corolla irregular. Fruit nearly sessile; ridges mucated with tubercles. See CONIUM *Africanum*.

CAPNOS, (Lobel.) See FUMARIA *officinalis*, and *spicata*.

CAPO, in *Ichthyology*, a name given by Paulus Jovius and some others to the fish called *coccyx* by the ancient Greeks, and *cuculus* by the Latin writers. It is presumed to be a species of *trigla*, most likely the modern *trigla gurnardus*; or, perhaps, applied indiscriminately to that species, and *trigla lyra*.

CAPO, *Ital.* the head, or beginning of any production. In vocal music, particularly in opera songs of two strains, *da capo*, at the end of the second strain, is an injunction to return to the beginning of the air or movement, or to any part of it where this character of reference $\$$, can be discovered, and pursue its course as far as this sign \curvearrowright , which is placed over the finale note. See SEGNO and CORONA.

CAPO-BIANCO, in *Geography*, a canton of the department of Golo, or isle of Corsica, containing 4147 inhabitants.

CAPO d' *Istria*, a sea-port town of Istria, belonging to the state of Venice, the see of a bishop, suffragan of Udina, situate in the gulf of Trieste, in an unhealthy district, near salt marshes; 7 miles S. of Trieste. N. lat. $45^{\circ} 48'$. E. long. 14° .

CAPOC, in *Commerce*, a sort of cotton, so fine and so short, that it cannot be spun. It is used in the East Indies to line palanquins, to make beds, mattresses, cushions, pillows, &c.

CAPOETA, in *Ichthyology*, a species of CYPRINUS, inhabiting the Caspian Sea, and in winter migrating up the rivers. The anal fin has nine rays, the third ray of the dorsal and anal being the longest, and serrated downwards; and it has two cirrhi. Gmelin.

COPOLETTO, a town and port of Asia, in Georgia, seated on the Black Sea.

CAPOLINIERI, a small town of the island of Elba, near the coast of Tuscany.

CAPOLITA, in *Geography*, a river of North America, in the province of Guaxaca, which runs into the Pacific Ocean, 18 miles N. E. of Tangelotargo.

CAPOLLIN, in *Botany*, *Mexicanorum Hernandez, seu Cerasus dulcis Indica*. It is a tree of moderate bigness, with leaves like those of an almond, or our country cherry tree. The flowers hang down in bunches, which are succeeded by fruit resembling our cherries. It blossoms in the spring, and bears fruit all the summer; it requires a temperate climate, and grows in gardens and fields in Mexico, as well spontaneously as by cultivation.

The juice of the young buds mollifies the tongue when parched by heat. A decoction of the bark being exposed to the sun for fifteen days, and the weight of a dram of it taken, cures the dysentery. The powder helps inflammations. In times of dearth, they make bread and drink of the fruit; but it affords an aliment inclining to melancholy, giving a rankness to the breath, and making the teeth black. There are three species of this tree, which differ only in fruit; but all of them hang in clusters.

CAPON, in *Rural Economy*, a cock chicken, which has been castrated as soon as left by the hen, or as soon as he begins to crow. Capons are useful to lead chickens, ducklings, young turkeys, pheasants, or partridges, as they do it better than hens, and at the same time defend them better from birds of prey, and, from the largeness of their bodies, they can cover a greater number of them, and much more completely. See POULTRY.

CAPON's Tail-graft. See FESTUCA.

CAPONIER, in French CAPONNIERE, or CAPONNIERE, a fort of double covert-way, with a parapet on each side, sloping, and terminating in the form of a glacis. All communications of this sort and form, between either the body of the place and the outworks, or between the salient angles of the covert-way, and either arrows or other works at the salient angles of the glacis, or between the salient angles of the covert-way, and detached redoubts, or works advanced to some distance beyond the glacis, for the purpose of occupying particular spots of ground, to prevent an enemy's getting possession of them, may with propriety be, and sometimes are, called caponiers.

When the communication is directly opposite to the middle of the curtain, and extends from the tenailles across a dry ditch to the re-entering angle of the counter-scarp, or of the ravelin, it is from twelve to fifteen feet wide, has a banquette on each side, as also a parapet, which terminates in the ditch in a gentle slope, in the form of a glacis, at the distance of ten or twelve fathoms from its interior side. The inside of it is excavated from two to four feet below the level of the ditch, and the parapet is raised from three to five feet above the same level. It serves as a safe passage for the troops from the body of the place to the counter-scarp and outworks. Such caponiers are frequently made in dry ditches, even when there are no tenailles opposite to the curtains.

The principal use of such caponiers is to defend, directly, the passage of the ditch opposite to the faces of the bastions, and to afford the soldiers a secure communication between the body of the place and the outworks. To prevent their being seen, as they are quitting or leaving them, the re-entering angles of the counter-scarp are often partly cut off by right lines parallel to the curtains and excavations, or lodgements

ments are made in those places, sometimes in one form and sometimes in another.

When such a communication is made between a saliant angle of the covert-way and a work on one at the foot of the glacis, it is commonly from twenty four to thirty feet wide, and has a traverse at its entrance, about eighteen feet thick, with a passage six or eight feet wide round it.

When such a communication is made from a saliant angle of the covert-way to a detached redoubt, or other work, advanced beyond the foot of the glacis, it is usually from thirty to thirty-six feet wide; and when it is of any considerable length, has commonly two traverses, one at its entrance, and the other in the middle, or about half way between the work and the foot of the glacis.

It was the custom formerly to cover the caponier with thick planks, and a quantity of earth upon them, and to open small embrasures or loop-holes in each parapet, for firing through on the enemy. But the smoke of the powder occasioned great annoyance and inconvenience to the men in it. It is, therefore, customary now to cover them, during a siege, only with hurdles or blinds, sufficiently to secure the men employed in defending them against stones, which the enemy may throw into the ditch to make them abandon it. The same nuisance and inconvenience from smoke would be found to arise from the making use of fire-arms in such casemated galleries, with loop-holes in the counter-scarp, as those in some of the works at Portsmouth. Other arms or offensive weapons than fire-arms might, undoubtedly, be made use of in them, with much less inconvenience than muskets, and at the same time with greater effect and certainty, at so short a distance as the width of the ditch. See FORTIFICATION, *figs.* 18.

CAPORALE, in *Biography*, an Italian performer on the violoncello, who came into England about the year 1734, and was much admired for the full and sweet tone which he drew from his instrument; which was his principal merit: for he was no deep musician, nor had he a powerful hand; yet he was always heard with great partiality by the public, and Handel frequently composed songs expressly to display his intelligible talent of tone.

CAPORALI, CÆSAR, an Italian poet, was born at Perugia, in 1530, and having been successively employed in the service of several cardinals, died in 1601, at the seat of his patron Ascanio, marquis of Cargno. As a poet in the burlesque, or burlesque style, he excelled most of those who wrote in the same style, particularly in decency of subject and imagery. His most popular piece was a satire on courts and courtiers, exposing to ridicule and contempt those who sink into servility and wretchedness by aspiring to fortunes in an attendance on the great. He wrote also some poems of the romantic class, as his "Life of Mæcenas," left unfinished, and two comedies, viz. "Lo Scioeco," and "La Ninnetta;" published at Venice in 1605. A collection of his poems, with the observations of his son, Charles, was published at Venice, in 1656 and 1662. Tiraboschi. Moreri. Gen. Biog.

CAPORNACK, in *Geography*, a town and castle of Hungary, in Slavonia.

CAPOT, at *Piquet*, is when one of the gamblers wins all the cards, in which case he gains forty points.

CAPO-TASTO, in *Music*, in high shifts on the violoncello, is shortening the strings, by making the thumb of the left hand serve as a nut on the finger-board; by which means the four fingers can play as many passages without altering the position of the hand, as in its natural position, without shifting.

CAPOTENA, or CAPOTANA, in *Ancient Geography*, a town of Asia, placed by Ptolemy in Aria.

CAPOTES, a mountain in Asia, in which, according to Pliny, was one of the sources of the Euphrates.

CAPPOUDIA, the *Caput Vada* of Procopius, the *Ammonis Promontorium* of Strabo, and the *Promontorium Brachodes* of Ptolemy, a long narrow slip of land, stretching itself a great way into the sea, on the western coast of the ancient Bizacium, or Tunis. Upon the point of this promontory are the ruins of the city that was built there by Justinian; where is likewise a high round watch-tower. Two more of the like kind occur between this place and Sfax; which are necessary guides to mariners in approaching this low and dangerous coast. To the S.E. of Capoudia are the two flat and contiguous islands of the "Querkinos," the ancient "Circina," and "Circinitis," at the distance of five leagues. At these islands Strabo and other ancient geographers fix the beginning of the Lesser Syrtis; though Dr. Shaw is of opinion, that it should rather commence at Capoudia. N. lat. 35° 2'. E. long. 11° 30'.

CAPOUL, or CAPUL, one of the smaller Philippine islands, lying a little south of Luzon. It is three leagues in compass; the soil is fertile, agreeable, and commodious for the Indians, who live after the manner of the Bisayas.

CAPOZWAR, a small but strong town of Hungary, seated on the river Capoz.

CAPPA, in *Ichthyology*, a species of *Sciæna*, having double scales on the sides of the head. Found in the Mediterranean.

CAPPADINE, in *Commerce*, a sort of silk flock, taken from the upper part of the silk-worm cocoon, after the true silk has been wound off. It is also called *laffis* and *carbass*, because slight stuffs under those names are made of it.

CAPPADOCIA, in *Ancient Geography* and *History*, was known to the ancients by the name of Syria or Assyria, and borrowed the name of Cappadocia, according to Pliny (l. vi. c. 3.) from the river Cappadox, or according to Herodian (apud Stephan.) from Cappadocus, the founder of this kingdom. In ancient times, this kingdom comprehended the whole of that country, which lies between mount Taurus and the Euxine sea; and was divided by the Persians into two satrapies, or governments; and by the Macedonians, under the successors of Alexander, into two kingdoms; the one called "Cappadocia ad Taurum," and "Cappadocia Magna," the other "Cappadocia ad Pontum," and commonly "Pontus," which see.

Cappadocia Magna, or "Cappadocia" properly so called, lay between the 38th and 41st degrees of north latitude; bounded on the north by Pontus, from which it was separated by a long chain of mountains, bearing towards the west the appellations of Lithrus and Ophlinus, and towards the east that of Paryadræ; on the south, by Lycaonia, and part of Armenia Minor; or, according to M. d'Anville, by mount Taurus, which separated it from Comagena and Cilicia; on the west, by Galatia and Phrygia; and on the east, by the Euphrates, and part of Armenia Minor, or, if it be made to comprise this latter province, it is almost wholly bounded by the Euphrates, which separated it from Sophena. In the time of Archelaus, Cappadocia was divided into ten prefectures, five of which lay near mount Taurus, viz. Melitena, Cataonia, Cilicia, Tyanitis, and Issauritis; and the other five comprehended the remaining part of the kingdom, of the situation and principal towns of which Strabo has given no information. According to Ptolemy Cappadocia, to which he also annexes Pontus, was bounded on the west by Galatia; on the south by Cilicia, and part of Syria towards the Amanus; on the east by Armenia Major and

the Euphrates; and on the north by that part of the Euxine sea, which extended from Amisus in Galatia to the branch of the Amanus that bounded the country on the east. The emperor Valens divided Cappadocia into two provinces, viz. "Cappadocia Prima" and "Cappadocia Secunda," of which latter Tyana was the metropolis. The metropolis of Cappadocia, in ancient times, was Mazaca or Eusebia, called afterwards *Cæsarea*, which see. Its other cities of note were Comana, Nyssa, Nazianzum, Archelaus, Diocæsarea, Faustianopolis, Cabiltra, and Pterium, which see respectively. The principal rivers of this country were the Melas, the Halys, and the Sarus.

Whatever may have been the national character of the Cappadocians at an early period and under their first sovereigns, they were in the time of the Romans reputed lascivious, lewd, and addicted to all manner of vice; and they were deemed so infamous among other nations, that a wicked and impious man was emphatically called a "Cappadocian." The following very ancient Greek epigram, applied to the Cappadocians, is recorded by Constantine Porphyrogenitus:

"Καππαδοκῶν ποτ' ἔχιδνα κακὰ δακεν, ἀλλὰ καὶ αὐτὴ,
Καίβανε γενναμένη τιμωρὸς ἰσθίου.".

"Cappadocem aliquando vipera inala momordit, sed et ipsa

Mortua est gustato sanguine virulento."

It was a nation so servile, says Strabo (l. xii. p. 372.), that when the Romans offered them their freedom to live by their own laws, they said they could not endure liberty. Cicero says of them, that they were "De Grege Venalium;" whence it is inferred, that this country furnished a great number of slaves; see also Persius Sat. vi. sub fin. Horat. Ep. vi. l. i. v. 39. This national character, however, underwent an important change after the introduction of Christianity; for we find among the natives of Cappadocia Gregory Thaumaturgus, Basil the Great, and Gregory of Nazianzum.

The religion of the ancient Cappadocians was much the same with that of the Persians. At Comana they had a rich and stately temple, consecrated to Bellona, whose priests and attendants of both sexes amounted, in Strabo's time, to more than 6000. On stated days they had exhibitions of battles, in which the priests and their attendants cut and wounded each other in a transport of enthusiastic fury. They had also several other magnificent temples of Apollo Cataonius, and of Jupiter, in the province of Morimena, which last had 3000 religious votaries. The chief priest, next in rank to that of Comana, had, as Strabo says (l. xii. p. 375.), a yearly revenue of 15 talents. Diana Persica was worshipped in the city of Castaballa, where women, devoted to the worship of this goddess, are said to have trodden barefooted on burning coals, without injury. The commerce of the Cappadocians in mules and horses, produced in their country, was very considerable. The horses that were bred on the plains, which stretched from the foot of mount Argæus to the banks of the Sarus, were renowned above all others in the ancient world, for their majestic shape and incomparable swiftness. Cappadocia abounded also with mines of silver, iron, and alum, and afforded alabaster, crystal, and jasper, and probably supplied the neighbouring countries with these commodities.

It has been thought by those who have made researches into the history of ancient nations, that Cappadocia was peopled by the descendants of Togarmah, the youngest son of Gomer. In the time of Cræsus some have supposed that Cappadocia formed a part of the kingdom of Lydia; and after the defeat of this prince, it became subject to the

Persians, to whom the Cappadocians paid an annual tribute, as Strabo says (l. xii. p. 370.), of 1500 horses, 2000 mules, and 50 000 sheep. The most ancient king of Cappadocia, recorded in history, is Pharnaces, a noble Persian, who, having saved Cyrus from a ravenous lion, that pursued him while he was hunting, was rewarded with his sister Atossa, and the kingdom of Cappadocia. This country was afterwards subdued by the Macedonians, and changed into a province; but it was restored to its former state by Ariarathes III., who, having escaped the general slaughter of the royal family by Perdiccas in the time of his father Ariarathes II., fled into Armenia; and availing himself of the civil dissensions that took place among the Macedonians, recovered his paternal kingdom, and transmitted it to his posterity. After a succession of 10 princes, Archelaus, though not related either to the family of Pharnaces or to that of Ariobarzanes, which had possessed the sovereignty, was placed on the throne of Cappadocia by Mark Antony, to whom he continued faithful till after the battle of Actium. But having offended Tiberius by paying him no respect, during his retirement at Rhodes, he was enticed to Rome by letters from Livia, who, without dissembling her son's resentment, promised him his pardon, on condition of his coming to implore it in person. Archelaus obeyed the summons; but was received by the emperor with contempt and indignation, and soon after accused as a criminal in the senate. Although the crimes alleged against him were mere fictions, he was so chagrined at being treated like a malefactor, that he is said by some to have soon died of grief, or, as others say (Tacit. Annal. lib. i.), he laid violent hands on himself. Upon his death, the kingdom of Cappadocia was reduced to a Roman province, and governed by those of the equestrian order. Germanicus, A. D. 18, regulated the affairs both of Cappadocia and Commagena, and appointed two of his friends to the government of these provinces. In the year 73, Vespasian sent troops into Cappadocia and attached the government of that province to the rank of consul, instead of the order of knights. In this state Cappadocia continued till the erection of the new empire of Trebisonde, with which it fell into the hands of the Turks; by whom the whole province, with the addition of Pontus, is now called Amasia, after the name of that city, where the beglerbeg of Anatolia resides. See AMASIA.

CAPPADOX, a river of Asia, which has its source in mount Amanus, and discharges itself into the Euphrates S. E. of Samofata.—Also, a river of Asia which bounded the Cappadocians on the side of Galatia, and commencing to the east of Saonda falls into the Halys at Aspona. See CAPPADOCIA.

CAPPAGUM, a town of Spain placed by Pliny in Bætica.

CAPPANUS, in *Conchology*, the name by which some old writers distinguish the *sea-worm*, or testaceous mollusca, called by recent authors *Teredo navalis*. This is also known by the name of ship-worm, being that particular species which bores into the bottoms of ships, and to obviate the pernicious effects of which they are now generally sheathed with copper from the keel to a little above the water's edge.

CAPPAREA, in *Ancient Geography*, a town of Asia, situate in a plain of Syria, S. E. of Apamea.

CAPPARIDES, or CAPPARIDEÆ, in *Botany*, the fourth order of the thirteenth class of Jussieu's natural orders, and the eighth order of the thirteenth class in the arrangement of Ventenat; with the following characters. *Calyx* either many-leaved, or one-leaved divided into segments. *Petals* four or five, often alternating with the divisions of the calyx. *Stamens* seldom of a definite number. *Germ* simple, often stipitate

C A P P A R I S.

tate or pedicelled; stipe or pedicel sometimes stamiferous and glandular at its base; style none, or rarely one; stigma simple. *Fruit* many-seeded, either a silique or a berry, one-celled (rarely many-celled?). *Seeds* often kidney-shaped, either bedded in the pulp of the fruit, or affixed to lateral receptacles. *Perisperm* none, though the interior coat of the seed is sometimes fleshy and swollen so as to appear like a perisperm. *Embryo* semicircular; radicle curved upon the lobes which are almost cylindrical, and applied one to the other. See Ventenat Pl. 15. fig. 3. *Stem* almost always a shrub or tree, rarely herbaceous. *Leaves* alternate, simple, entire, rarely ternate or digitate, proceeding from naked, scaleless buds; sometimes with two stipules, spines or glands at their base. Its genera, according to Jussieu, are cleome, cadaba, capparis, fodaba, crateva, morifonia, and durio; the following are added as nearly allied, margrafia, norantea, refeda, drosera, and parnassia. Ventenat describes under this order only cleome, capparis, crateva, and morifonia; refeda and parnassia as nearly allied.

CAPPARIS, (καππαρίς, Theophras. Dioscorides; derivation uncertain. Some suppose it originally Arabic.) Linn. gen. 643. Schreb. 8-6. Willd. 1010. Juss. 243. Vent. 2. 120. Tourn. 139. Class and order, *polyandria monogynia*. Nat. Ord. *putamineæ*, Linn. *capparides*, Juss. Gen. Ch. *Cal.* Perianth four-leaved or four-cleft, leathery; leaves or segments egg-shaped, concave, gibbous, caducous. *Pet.* four, obtuse, spreading, generally large. *Stam.* Filaments generally numerous, thread-shaped, spreading; anthers oblong, versatile, inclined. *Pist.* Germ pedicelled; style none; stigma obtuse. *Peric.* Berry, capsule or silique, fleshy, various in shape, one-celled, pedicelled. *Seeds* generally numerous, kidney-shaped.

Eff. Ch. *Calyx* four-leaved or four-cleft; leathery. *Petals* four, stamens long. *Pericarp* fleshy, one-celled, pedicelled. Obs. *C. cantoniensis* has a five-leaved calyx and five petals.

* With spiny stipules.

Sp. 1. *C. spinosa*, caper-bush, Linn. Sp. Pl. 1. Willd. 1. Lam. Encyc. 1. Martyn's Miller 1. Smith spicil. 2. 18. tab. 20. Lam. Ill. Pl. 446. Woodv. Med. Bot. Pl. 228. Curtis Bot. Mag. 291. "Peduncles one-flowered, solitary; leaves roundish, obtuse, smooth; capsules oval," Willd. A low shrub, generally growing out of the joints of old walls, the fissures of rocks, and among rubbish. *Stems* trailing two or three feet long, round, smooth, branched; branches alternate, spreading, often downy. *Leaves* on short petioles, alternate, in the wild plant often terminated by a little sharp point which disappears by culture, entire, a little fleshy, veiny, smooth, bright green; spiny stipules two, sharp, a little recurved, yellowish, in the cultivated plant nearly obliterated. *Flowers* large, beautiful, scentless; peduncles axillary, round, about the length of the leaves, first horizontal, finally pendulous; calyx leaves unequal, tipped with purple; petals white, with a faint tincture of red, larger than the calyx, spreading, inversely egg-shaped, waved; the two upper ones a little cohering at their base; stamens very numerous, the length of the petals or longer; filaments pale purple; germ oval, small, green; pedicel purplish, longer than the stamens. *Fruit*, according to Linnæus, a berry; Dr. Smith, a capsule; La Marck, a silique; but it is evident from his figure that he has given it an improper denomination. Supposed to have been originally a native of Asia, but from long cultivation naturalized in the southern parts of Europe. Dr. Smith says that it is as common in the South of France as the bramble with us. Mr. Ray observed it wild on the walls of Rome, Sienna, and Florence. Between Marseilles and Toulon and in many

parts of Italy it is cultivated on a large scale for the sake of the young buds of the flowers which are pickled for the table and exported in considerable quantities. The plants are raised from suckers set in a quincunx form about ten feet distant from each other. They require shelter from cold winds and a favourable exposure to the sun, and scarcely ever suffer from drought and heat. In spring, they need only one dressing; in autumn they are cut down to within six inches of the ground and covered with the surrounding earth, which is raised about them on all sides. In the succeeding spring they are laid bare to the crown of the root and soon throw out young shoots. In an early part of the summer they begin to flower; and a succession of them continues till they are destroyed by the cold of the advancing winter. The young buds of the flowers are carefully gathered every morning by women and children; for as they increase in size, they diminish in value. They are immediately thrown into vessels full of vinegar with the addition of a little salt, and when a sufficient quantity is collected, are sold to the pickle merchants, who riddle them and distribute them in different parcels according to their size; then put them again in vinegar, and pack them up for sale. The green fruit also, when it has attained to the size of an olive, makes a grateful pickle. Bosc. The pickled caper bud has the character of an antiscorbutic, and of removing hepatic and other visceral obstructions; but the part of the plant which has chiefly been recommended for medicinal purposes is the bark of the root. Its taste is somewhat aromatic, bitterish and acrid. By Dioscorides and other ancient writers, it was thought of great efficacy as a deobstruent, and in this view has been recommended by Forestus and Sennertus, but its use is now wholly laid aside. Woodville. Though this plant, when trained against a wall, grows luxuriantly in the open air at Paris, it is preserved with difficulty in England, and can scarcely be made to flower unless kept in a stove. 2. *C. ovata*, Willd. 2. Desfont. Fl. Att. 1. p. 404. (*C. spinosa*, β. Linn. *C. folio acuto*; Bauh. pin. 460.) "Peduncles one-flowered, solitary; leaves roundish-egg-shaped, acute, smooth; capsules oval." A native of Sicily, Spain, and Barbary. According to Miller it is merely a variety of *C. spinosa*. 3. *C. ægyptia*, Lam. Enc. 2. Willd. 3. "Peduncles solitary, one-flowered; leaves roundish-wedge-shaped, mucronate at the tip." Lam. A shrub. *Branches* stiff, slender, round, smooth, stipular spines two, crooked, gold-coloured. *Leaves* small, about six lines long, and five at their greatest breadth, glaucous, petioled. *Flowers* dull white; peduncle smooth, longer than the leaf. *Fruit* club-shaped, about three inches long and three lines thick. MSS. of Lipp. who observed it in Egypt, preserved in the herbarium of Inard. 4. *C. tomentosa*, Lam. Enc. 5. Willd. 4. (*Cratæva* Adans. Herb. Seneg. p. 41.) "Peduncles solitary; leaves oblong-egg-shaped, obtuse, downy; filiques spherical." *Branches, leaves, and peduncles* covered with a short, greyish, cottony down. *Stipular* spines two, crooked. *Leaves* about an inch and a half long, five or six lines broad, a little emarginate; petioles short. *Flowers* axillary. Found by Adanson in Senegal. 5. *C. pyrifolia*, Lam. Enc. 8. "Peduncles one-flowered, solitary, very short; leaves lanceolate-egg-shaped, acuminate; younger ones downy." β. flowers fasciculated. A shrub. *Branches* slender, round, downy towards their summit; stipular spines two, short, crooked. *Leaves* alternate, distant, petioled, three inches long, a little more than an inch broad. *Flowers* axillary; stamens very long. Found by Poivre in the East Indies, preserved in the herbarium of Jussieu. 6. *C. acuminata*, Willd. 5. "Peduncles in pairs, one-flowered; leaves egg-shaped, acuminate, covered underneath with a rust-coloured

coloured down." Willd. A shrub. *Branches* round, zigzag; stipular spines two, straight. *Leaves* petioled, alternate. *Flowers* axillary, sometimes three together; peduncles longer than the petioles; calyx downy; stamens longer than the corolla. A native of the East Indies, described from a dried specimen by Willdenow, who doubts whether it differs specifically from *La Marck's pyrifolia*. 7. *C. zeylanica*, Linn. Spec. 2. Willd. 6. Lam. 3. Mart. 2. Pet. Mus. 625. Burm. Zeyl. 53. Ind. 118. Loureiro Cochinch. 330. "Peduncles solitary, one-flowered; leaves egg-shaped, acute at both ends." A shrub. *Stem* six feet high, upright, but weak; branches divaricating; spines two, small, crooked. *Leaves* twice as long as broad, alternate, remote, entire, smooth on both sides. *Flowers* axillary, sometimes two together, white; petals oblong, spreading, nearly equal; with a lateral, prominent, cloven nectary; stamens thrice the length of the corolla. *Fruit* unknown to Linnæus. *Berry* black, roundish, fleshy, small, one-celled, with three seeds; peduncle long. Lour. A native of Ceylon and Cochinchina, in hedges. 8. *C. horrida*, Linn. jun. Sup. 264. Willd. 7. Mart. 3. Lam. 10. "Peduncles in pairs, one-flowered; leaves lanceolate-egg-shaped, mucronate, smooth." A tree. *Branches* stiff, zigzag; spines two, strong, red. *Leaves* petioled. *Flowers* axillary. A native of the East Indies. 9. *C. erythrocarpus*, Willd. 8. Gmel. Syst. 806. Bert. Aët. Soc. Berol. ix. p. 339. tab. 9. bad. "Peduncles solitary, one-flowered; leaves oblong, acuminate, mucronate; pericarps hexagonal." A shrub. *Branches* divaricated, round; stipular spines two, reflexed. *Leaves* alternate, petioled, smooth, beset with stellated hairs here and there on the under surface, especially on the midrib. *Flowers* axillary. *Fruit* red. A native of Guinea. 10. *C. divaricata*, Lam. 7. "Stem much branched, branches zigzag, divaricated; leaves linear, narrow, acute, nearly sessile. Lam. A shrub, smooth in all its parts. *Branches* slender; spines two, short, crooked. *Leaves* about an inch long, alternate, on very short petioles. A native of the East Indies, preserved in the herbarium of Jussieu. Does it differ from the preceding? 11. *C. cantoniensis*, Mart. 18. Lour. Cochinch. 331. "Flowers in racemes; leaves egg-shaped, acuminate, wrinkled." *Stem* shrubby, upright, branched. *Leaves* entire, smooth, alternate. *Flowers* white; calyx five-leaved; leaves oblong concave, coloured; petals five, oblong, spreading, the length of the calyx; filaments long. *Berry* egg-shaped, small, brown, peduncled. *Seeds* numerous. A native of China about Canton. 12. *C. sepiaia*, Linn. Sp. Pl. 3. Willd. 9. Mart. 4. Lam. 6. "Peduncles in umbels; leaves egg-shaped, emarginate." A shrub. *Branches* slender, round, zigzag, pubescent; spines two, crooked, short, blackish at their summit. *Leaves* alternate, pubescent, on short petioles. *Umbels* simple, terminal, many-flowered; common peduncles short. A native of the East Indies. 13. *C. citrifolia*, Lam. 9. Willd. 10. "Flowers in umbels; leaves oblong-egg-shaped, smooth, leathery." A shrub. *Branches* thick, stiff, smooth, pubescent towards their summit; spines two, crooked, placed near together. *Leaves* petioled, numerous and crowded. *Flowers* on short peduncles, umbels terminating the branches. A native of the Cape of Good Hope, communicated to La Marck by Sonnerat. 14. *C. corymbosa*, Lam. 4. Willd. 11. (Cratæva, Adan. herb. Seneg. n. 41. A.) "Flowers in terminal corymbs; leaves oval, pubescent beneath." A shrub. *Branches* stiff, round, downy; spines two, crooked. *Leaves* petioled. *Flowers* peduncled; peduncles and calyxes pubescent. A native of Senegal.

** Without spines.

15. *C. cordifolia*, Lam. 27. (*C. mariana*, Willd. 12.) "Pe-

duncles solitary, one-flowered; leaves heart-shaped, petioled; younger ones covered with a mealy down." Lam. A shrub, resembling in habit *C. spinosa*. *Branches* cylindrical, full of pith. *Leaves* alternate, terminated by a blunt point, green on both sides. *Flowers* axillary, white, large; peduncles shorter than the leaves; stamens a little longer than the petals. Found in the Marianne islands by Sonnerat. 16. *C. puticosa*, Mart. 23. Mil. 7. "Peduncles solitary, one-flowered; leaves lanceolate, acute, perennial." *Stem* shrubby, from twelve to fourteen feet high, with a dark brown bark, and numerous strong branches. *Leaves* of a thicker consistence than those of the Bay-tree, alternate, on short petioles. *Flowers* axillary, small, on short peduncles; filaments white; anthers purplish. Sent to Mr. Miller from Tolu. 17. *C. arborescens*, Mart. 21. Mill. 3. "Peduncles solitary, one-flowered; leaves lanceolate-egg-shaped." *Stem* woody, from twelve to fourteen feet high, with a russet bark and many branches. *Leaves* on long petioles. *Flowers* lateral, on long peduncles, similar to those of the next species. Sent to Mr. Miller from Carthage in New Spain. 18. *C. Badukka*, Linn. Sp. Pl. 4. Willd. 12. Mart. 7. Lam. 13. (Badukka; Reed. Mal. 6. p. 105. tab. 57. Rai. hist. 1630. "Peduncles generally solitary, one-flowered; leaves perennial, oblong-egg shaped, determinately crowded, naked." Linn. A shrub, five or six feet high. *Stem* the thickness of the human arm. *Leaves* alternate, acute, entire, smooth on both sides, green, rather thick, soft, on short petioles. *Flowers* axillary, and terminal, sometimes two or three together, bluish white; petals unequal, wedge-shaped; stamens the length of the petals. 19. *C. amplissima*, Willd. 23. Lam. 14. (*C. conferta*, Mart. 24. Mill. 8. ? *C. alia arborescens*, lauri foliis, fructu oblongo ovato; Plum. Spec. 7. ic. 73. fig. 2.) "Peduncles one-flowered, solitary; leaves elliptical, smooth, veined; stamens longer than the corolla; fruit inversely egg shaped." Confounded by Linnæus with the preceding. A considerable tree, with a thick, blackish wrinkled bark. *Leaves* towards the summit of the branches, numerous, alternate, of a beautiful green; resembling those of laurel, but larger, thicker, and less acute. *Flowers* axillary and terminal, large, white; petals concave, an inch and half long; stamens white, numerous, much longer than the petals; peduncles long. *Fruit* larger than a goose egg, fleshy; rind thick, wrinkled. A native of Hispaniola. 20. *C. torulosa*, Willd. 15. Mart. 19. Swartz. Prod. 81. (*Bryonia arborescens filiqua torosa*; Brown Jani. 246.) "Peduncles generally two flowered, terminal; leaves lanceolate-oval, dotted with white underneath, filques round, linear, swelling into small protuberances." A shrubby tree. Native of Jamaica. 21. *C. saligna*, Willd. 25. Vahl. Symb. 3. p. 66. "Peduncles two or three-flowered, solitary, terminal; leaves linear-lanceolate, dilated on each side towards the base, smooth; fruit round, swelling into small protuberances." *Branches* round, zigzag, smooth, with an ash-coloured bark. *Leaves* three inches long, a quarter of an inch broad towards the summit, generally broader towards the base, petioled, alternate, entire, mucronate, rounded, or a little heart-shaped towards the base, veined, smooth; petioles short; frequently with small axillary glands. *Calyx-leaves* rounded, leathery. *Filaments* numerous, very long, capillary, smooth. *Germ* linear-oblong, truncate. *Berry* two or three inches long, the thickness of a swan's quill, obtuse, smooth, compressed between each seed; pedicel longer than the fruit. Seeds two or five. A native of St. Cruz: Q. does it specifically differ from the preceding? 22. *C. triflora*, Mart. 25. Mill. 10. "Peduncles three-flowered, terminal; leaves lanceolate, nerved, perennial." *Stems* shrubby, slender, seven or eight feet high, much branched. *Flowers* small, white.

Fruit

CAPPARIS.

Fruit oval. Cultivated by Mr. Miller, but no native place mentioned. 23. *C. pulcherrima*, Linn. Sp. Pl. p. 1674. Willd. 26. Mart. 9. Lam. 25. Jacq. Amer. 163. tab. 106. piët. 80. tab. 155. "Flowers in racemes; leaves oblong, obtuse; berries roundish." An elegant, upright shrub; in open dry situations only two or three feet high, in woods twelve. *Branches* round, smooth. *Leaves* often ten inches long, alternate, petioled, entire, leathery, shining. *Raceme* terminal, simple, upright, six inches long, handsome. *Flowers* pale yellow, sweet scented; filaments at first white, then of a beautiful purple. *Berry* yellowish; pulp or flesh when unripe, hard, with little scent; when ripe, soft, fetid and nauseous. *Seeds* kidney-shaped, a little compressed, enveloped in a white, thin, strong membrane. A native of Carthage in New Spain, on the declivities of mountains. 24. *C. tenuisliqua*, Willd. 27. Lam. 23. Jacq. Amer. 162. tab. 105. "Racemes erect, terminal; leaves lanceolate-egg-shaped, acute; siliques cylindrical." A shrub, with few branches; in shady places fifteen feet high. *Leaves* alternate, petioled, shining, deciduous. *Racemes* simple, six or seven inches long, containing about fifty greenish white, scentless flowers, which open in succession about the month of April, after the fall of the leaf. *Siliques* slender, six or seven inches long. A native of New Spain about Carthage. 25. *C. linearis*, Linn. Sp. Pl. p. 1674. Willd. 28. Mart. 10. Lam. 20. Jacq. Amer. 161. tab. 102. "Peduncles somewhat racemed; leaves linear." A tree. *Stem* about fifteen feet high, upright, branched, elegant. *Leaves* four inches long, entire, leathery, blunt, with a very protuberant midrib; the sides often revolute; petioles short. *Flowers* about ten in a raceme, white, large, scentless. *Racemes* terminal or axillary. *Siliques* about an inch long, orange-coloured, swelling into protuberances. A native of New Spain about Carthage. 26. *C. nemorosa*, Lam. 26. Jacq. Amer. 164. tab. 181. "Flowers in racemes; leaves acuminate; fruit berry-shaped." A tree. *Stem* twenty feet high, upright, branched. *Leaves* leathery, shining above, covered beneath with a down, which rubs off when touched, and disappears as the leaf grows old. *Fruit* oval-oblong. A native of woods near Carthage. 27. *C. falcata*, Mart. 17. Lourciro Coch. 331. "Flowers in racemes; leaves ternate, sickle-shaped." A large tree with spreading branches. *Leaves* lanceolate-egg-shaped; lateral ones sickle-shaped at the base; entire, smooth, petioled. *Flowers* white; stamens eighteen. *Berry* oblong, red, large, one-celled, peduncled. *Seeds* many, bedded in the pulp. A native of China. 28. *C. racemosa*, Mart. 22. Mil. dict. 5. "Flowers in racemes; leaves egg-shaped, opposite, perennial." A tree. *Trunk* about twenty feet high; branches numerous, long, slender; with a brown bark. *Leaves* like those of the Bay-tree, but longer and deeply ribbed on their under side, on rather long petioles. *Flowers* large, white. *Siliques* two or three inches long, the thickness of a man's little finger, fleshy. *Seeds* large, kidney-shaped. 29. *C. panduriformis*, Lam. 28. Willd. 13. "Peduncles one-flowered, aggregate, terminal; leaves oblong, fiddle-shaped." *Stem* shrubby. *Leaves* four inches long, an inch and half broad, alternate, acute, smooth, on short petioles. A native of the Isle of France, found by Sonnerat. 30. *C. basifolia*, Linn. Sp. Pl. 10. Willd. 30. Mart. 12. Lam. 21. Jacq. Amer. 159. tab. 174. fig. 56. "Peduncles many-flowered; leaves lanceolate-halberd-shaped, shining." An upright, weak shrub; branches few, often six feet long. *Leaves* alternate, petioled, from three to seven inches long, leathery. *Flowers* purple, sweet-scented, in terminal racemes. 31. *C. Breynia*, Linn. Sp. Pl. 7. Willd. 29. Mart. 11. Lam. 16. Jacq. Amer. 161. tab. 103. (*Breynia elæag-*

ni foliis; Plum. gen. 40. Breyn. ic. 13. c. fig.) "Peduncles in racemes; leaves permanent, oblong; peduncles and calyxes downy; flowers octandrous," Linn. "Peduncles many-flowered; leaves lanceolate-egg-shaped, shining above, rough with scaly points beneath; siliques round, swollen with the seeds, a little scaly." Lam. A shrub, or small tree with the habit, according to Plumier, of an almond-tree or an Oleaster. *Stem* upright, smooth; branches zigzag, brown, scarred with the fallen leaves, covered near the summit with small rust or ferruginous scales. *Leaves* little more than two inches long and one broad, alternate, smooth and shining above, hoary-ferruginous and roughish, with a mixture of silvery and ferruginous, very small scales or dots beneath, similar to those of Hippophaë, some species of Cistus, and a few other plants; petioles angular, hoary-ferruginous. *Flowers* rather large, white, tinged with purple, very sweet scented, peduncles terminal, and axillary from the upper leaves, forming a sort of corymb, from two to four flowered; calyx-leaves reflexed, convex, white on the inside, ferruginous beneath, and somewhat rugged; petals twice as large as the calyx, entire, spotted with rust colour on the outside, deciduous; nectariferous glands four, small, egg-shaped, acute, compressed, permanent; filaments long, meeting at the base round the germ, covered with a pale red pile, eight according to Plumier's figure; but Reichard asserts that they are more, and that the species is properly polyandrous; anthers almost erect, acuminate, curved inwards, yellow; germ elongated, minute, on a short pedicel; style the length of the stamens; stigma thickened, obtuse, ferruginous. *Fruit* from three to five inches long, cylindrical, two-valved. *Seeds* kidney-shaped. A native of the sea-coast in the West Indies. 32. *C. filiquosa*, Linn. Sp. Pl. 6. Lam. 19. Mart. 14. (*C. Breynia* β. Willd.) "Peduncles one-flowered, compressed; leaves permanent, lanceolate-oblong, acuminate, dotted beneath." Linn. A native of Jamaica. β. leaves linear, narrow, very acute. A native of the Antilles. *Leaves* four or five inches long, smooth above, beset with silvery and ferruginous scales beneath. Seen by La Marck in the herbarium of Jussieu. 33. *C. ferruginea*, Linn. Sp. Pl. 8. Willd. 18. Mart. 6. Swartz. Obs. 208. (*C. octandra*, Jacq. Amer. 160. tab. 100. bad. *Cratæva foliis singularibus*, Brown. Jam. 247. tab. 28. fig. 1. good. *C. amygdalina*, Lam. 17.) "Peduncles in umbels; leaves permanent, lanceolate, downy beneath; flowers octandrous." Linn. A small tree or shrub. *Branches* striated, ferruginous. *Leaves* opposite, entire, smooth above, lanuginous-ash-coloured beneath; petioles ferruginous, short. *Flowers* white, terminal, on bifid and trifid peduncles, forming a corymb rather than an umbel, fragrant; calyx four-cleft, flat at the base, permanent; segments spreading, equal, acute; petals equal, concave; claws inserted into the divisions of the calyx, and of the same length; nectaries four, egg-shaped, placed between the petals and the column of the pistil; filaments seldom more than eight, fixed to the pedicel of the germ, shorter than the corolla; anthers oblong, inserted into the filaments; germ egg-shaped, on a round pedicel, half the length of the corolla; stigma sessile, club-shaped. *Berry* fleshy, oblong. *Seeds* five or six, oblong, Swartz. The plant is strongly impregnated with an acrid, volatile salt, like the mustard tribe; and hence, in Jamaica, where it grows wild, it is called the mustard plant. Browne misled by this circumstance, and the regularity of the calyx, petals, and nectaries, referred it to the class tetradynamia. Martyn's Miller. La Marck gives the following specific character and description of his *C. amygdalina*, which he conjectures may be the ferruginea of Linnæus. "Peduncles many-flowered; leaves oblong-lanceolate; veined, smooth above;

above; scaly-silvery beneath." Young branches, petioles, peduncles, and calyxes covered, like hippophæ rhamnoides, with ferruginous scales. *Leaves* alternate, petioled, acute, smooth above, but not shining like those of *C. breynia*; covered beneath with small, silvery, roundish scales, having a ferruginous dot in the middle; from three to four inches long, and scarcely an inch broad. *Flowers* rather small, terminal, several together, on short peduncles. *Siliques* five or six inches long, cylindrical, a little swollen by the seeds, and of a reddish colour. A native of the Antilles, and described from a dried specimen in the herbarium of Jussieu. 34. *C. odoratissima*, Willd. 21. Jacq. hort. Schreb. 1. p. 57. tab. 110. "Peduncles many-flowered; leaves oblong-lanceolate, dotted with scales beneath." *Leaves* attenuated and rounded at the base, acute at the summit. *Flowers* the size of those of the common myrtle. *Petals* violet. *Stamens* a little longer than the corolla. The specific character as given by Willdenow is not sufficiently discriminative. 35. *C. longifolia*, Willd. 16. Mart. 20. Swartz Prod. 81. Pluk. phyt. tab. 327. fig. 6. "Inflorescence unknown; leaves linear-lanceolate, with mealy dots underneath." A native of Jamaica. 36. *C. jamaicensis*, Willd. 20. Lam. 22. Jacq. Amer. 160. tab. 101. "Peduncles many-flowered; leaves oblong, obtuse, emarginate, downy beneath; corolla semi erect, or bell-shaped." A shrub about six feet high, upright, branched, bushy; old branches smooth, blackish; young ones downy, ash-coloured. *Leaves* alternate, petioled, leathery, two inches long. *Flowers* yellowish white, fragrant; peduncles downy, terminal, and axillary. A native of Jamaica. 37. *C. cynophallophora*, Linn. Sp. Pl. 5. and *C. flexuosa*, Sp. Pl. 9. Willd. 24. Mart. 8. Lam. 15. Jacq. Amer. 158. tab. 98. *C. arborecens*, fructu longissimo. Plum. Sp. 7. ic. 73. fig. 1. (*Cynophallophorus*, Pluk. 126. tab. 172. fig. 4. *morisonia flexuosa*, Amæn. Acad. 5. p. 398. *Breynia foliis oblongis obtusis*, Browne Jam 246. tab. 27. fig. 1. *Acaciæ affinis*, siliqua tereti ventricosa interiore tunica mucosa miniata, Sloane Jam. 1538. hist. 2. p. 59.) "Peduncles many-flowered, terminal; leaves elliptical, obtuse, smooth; glands axillar; fruit cylindrical, swollen by the seeds." Willd. A shrub twelve feet high in a good soil. *Branches* long, weak, pendant, or supported by the neighbouring shrubs. *Leaves* about three inches long, alternate, smooth, veined, on short peduncles. *Flowers* white, large, very fragrant; stamens often four inches long. *Siliques* about six inches long, as thick as the human finger, opening longitudinally by two valves. *Seeds* kidney-shaped, very white, bedded in the bright scarlet flesh, or pulp of the valves. A native of the West Indies, sent to Mr. Miller from Carthage. Willdenow makes the *flexuosa* of Linnaeus a variety, but according to Martyn, it has been determined from an imperfect specimen in the Linnæan herbarium, to be in no wise different from *C. cynophallophora*. 38. *C. verrucosa*, Willd. 22. Lam. 24. Jacq. Amer. 159. tab. 29. "Peduncles many-flowered; leaves oblong, acute, glossy on both sides; fruit warty." Habit of the preceding. *Axillary* glands none. *Flowers* white, very open, with little smell; nectariferous glands flat, umbilicated; stamens an inch long, not much longer than the corolla. *Siliques* oblong, round, green, shining, entirely covered with warts, two-valved, about an inch and half long; pulp white. Jacq. A native of thickets about Carthage. 39. *C. frondosa*, Linn. Sp. Plant. p. 1674. Willd. 17. Mart. 5. Lam. 12. Jacq. Amer. 162. tab. 104. "Peduncles in umbels; leaves crowded on all sides." A shrub commonly about seven feet high, but in thick shady woods not less than twenty; branches few. *Leaves* varying in size, the largest near a foot long, broad-lanceolate, acuminate, smooth, nerved,

veined. *Flowers* an inch in diameter, greenish, or purple, scentless; common peduncle round, shining, erect, terminal. *Fruit* cylindrical, an inch and half long, shining, dark purple; flesh whitish. A native of South America. 40. *C. grandis*, Linn. jun. Supp. 263. Willd. 19. Mart. 15. Lam. 11. "Corymbs terminal; leaves egg-shaped, acute, smooth; fruit globular." A large hoary tree. *Leaves* alternate, entire, veined. *Flowers* pale yellow, in terminal corymbs, which are finally elongated into racemes. *Fruit* large. A native of the island of Ceylon. 41. *C. magna*, Mart. 16. Loureiro Coch. 331. "Corymbs terminal; leaves ternate, lanceolate." A middling sized tree. *Branches* spreading. *Leaves* entire, smooth. *Flowers* large, white; calyx wheel shaped; segments lanceolate, flat, interrupted; petals broad-egg-shaped, sharp at both ends, many-nerved, veined, spreading, equal, with long claws; filaments twenty-four, very long; anthers three-celled, oblong, recurved; germ roundish, pedicelled; style short. *Berry* two inches long, roundish, fleshy, eatable, dotted, rough, one-celled. *Seeds* numerous, kidney-shaped, bedded in the flesh, or pulp. A native of Cochinchina, much resembling *C. grandis*, and differing from it chiefly in its ternate leaves. 42. *C. oblongifolia*, Lam. 29. Forsk. Ægyp. p. 99. "Leaves oval-oblong, obtuse, but ending in a sharp pointed tooth, perennial." 43. *C. mitridatica*, Lam. 30. Forsk. Ægyp. 99. "Leaves alternate, pendulous, linear-lanceolate."

Obf. The fruit of this remarkable genus merits a more accurate investigation. Authors are not agreed what it should be called in several of the species, and seem to have given it a name rather from its external form, than from a proper regard to its internal structure.

Propagation and Culture.—These plants can be raised in England only from seeds, which should be brought over in the capsules wrapt up in well-dried tobacco leaves to preserve them from insects. As they germinate immediately when fresh, it is not easy to get them dry to Europe; on that account they are scarce in our stores, although many of them were cultivated by Miller. The seeds should be sown in small pots, filled with light sandy earth, and plunged into a hot-bed of tanners-bark; and should be allowed only a small quantity of water. They will frequently remain in the ground a whole year before they vegetate, and therefore require protection in winter. In the spring following, the pots must be plunged into a fresh hot-bed, and when the plants are come up, should have much air and little water. When large enough to remove, they should be transplanted singly into separate pots. In autumn they must be taken into the stove, and plunged into the hot-bed, where they should constantly remain, and be treated like other plants from the same countries, but should never have much water. Miller.

CAPPARIS Morisonia, (Swartz.) See MORISONIA.

CAPPARIS Fabago, (Dodoens.) portulacæ folio, (Bauh. pin.) See ZYGOPHYLLUM *Fabago*.

CAPPEL, LEWIS, in *Biography*, an eminent French Protestant divine and Scripture critic, was born at Sedan in 1585; and becoming minister and Hebrew professor at Saumur, he distinguished himself in the controversy concerning the antiquity of the Hebrew vowel-points. His elaborate work, entitled "*Arcanum punctuationis revelatum*," Leyd. 1624, contains strong arguments to prove that the points were not used by the original Hebrew writers, but were added to the text by the Masorites. He also maintains, that the characters of the Hebrew text were those used by the Chaldeans after the Babylonish captivity, and that before that period the Jews always employed the Samaritan character. The members of the reformed and Lutheran churches

churches were alarmed by this hypothesis, conceiving that it tended to diminish the authority of Scripture, and to reduce it to a level with tradition. The Roman Catholics, on the other hand, eagerly adopted it. It is affirmed, however, that the leaders of the reformation, Luther, Zuingle, and Calvin, were of the same opinion, and the hypothesis is now very generally received. Cappel, unintimidated by opposition, pursued his plan, and in his famous work, entitled, "*Critica Sacra*," fol. Paris, 1650, produced a number of various readings, and a list of the errors of copyists in the Bible, accompanied with critical remarks. See BIBLE. The printing of this work was delayed for 10 years, by the opposition it met with at Geneva, Sedan, and Saumur; till at length a son of Cappel, who was a convert to popery, obtained permission by the interest of fathers Petau, Morin, and Merfenne, to print it at Paris. It was warmly attacked by John Baxter, in his "*Anticritica*," and by other divines; but Grotius, in a letter to the author, expressed his approbation of the work. Cappel likewise published "*Sacred Chronology*," Paris, 1655, which is printed by Walton in the Prolegomena to his Polyglott. After his death were printed his "*Commentaries, theological and critical, on the Old Testament*," together with the defence of his "*Arcanum*," at Amsterdam, 1689, fol. This learned writer died at Saumur in 1658. Moreri. Mosheim, E. H. vol. v. p. 377, &c.

CAPPEL, in *Geography*, a place of Switzerland, in the canton of Zurich, where, on account of a religious dispute, a battle was fought between the Catholics and Protestants, in 1531, in which Zuingle, the reformer, lost his life; 9 miles S. of Zurich.

CAPPEL, or WALDKAPEL, a town of Germany, in the circle of the Upper Rhine, and principality of the Upper Hesse; 22 miles S.E. of Cassel.

CAPPEL, or KAPPEL, a small but neat town of Denmark, in the duchy of Sleswic, on the east coast; 16 miles N.E. of Sleswic. It contains about 550 inhabitants, who are industrious, and carry on some trade, exporting bacon, cheese, butter, eggs, and other commodities to Copenhagen, and supplying the interior parts of the province with coffee, sugar, spices, and other foreign merchandize. The environs of Cappel are very pleasant, being grounds gently rising, sprinkled with much wood, and commanding fine views of the bay. N. lat. 54° 44'. E. long. 10°.

CAPPELLA, *Ital.* a chapel. This substantive is rendered a musical term on many occasions, as *maestro di cappella*, a chapel master, or the director and composer of a chapel establishment, a coryphæus. A *cappella*, music in a chapel or church style. But the title of *maestro di cappella* is not confined to ecclesiastical composers and masters of a choir, but is extended to composers of an opera, and to composers in general. Nor does *cappella* always imply that a prince or nobleman who retains a band of vocal and instrumental performers in his service, has choral duty daily performed in his chapel; but that he has a band for his evening or occasional concerts, in his palace or mansion; as was the case with the duke of Chandos, at Cannons, in the beginning of the last century.

CAPPELLINE, in *Heraldry*, a mantling, or a sort of covering or hood, represented entire; not cut, and hanging back over the neck of the wearer. See MANTLING.

CAPPELLO, BERNARDO, in *Biography*, a celebrated Italian poet, was born at Venice about the beginning of the 16th century, and imbibed from Bembo, with whom he was intimate, the principles of Italian poetry. To his judgment, however, Bembo submitted his own poems. Cappello, in consequence of an opinion maintained by him in the senate, Vol. VI.

which was thought to be dangerous to the public tranquillity, was banished in 1540, to the isle of Arbe in Slavonia, where he continued two years; but being cited to give an account of his conduct, he thought it most prudent to seek refuge, with his wife and family, in the ecclesiastical state, where he was honourably received by cardinal Alexander Farnese, and appointed governor of Orvieto and Tivoli. After spending some time at the court of Urbino, the resort of the finest geniuses of Italy, he was induced, on account of the insupportable air of Pisaro, to return to Rome in 1559, where he died in 1565. The "*Canzonier*" of Cappello is much celebrated, as an excellent model for students in poetry. A new edition of his poems, together with those of Domenico Vaniero, was published in Bergamo in 1751 and 1753. Tiraboschi. Gen. Biog.

CAPPELN, in *Geography*, a town of Germany, in the circle of Westphalia, and county of Tecklenburg; 8 miles N.E. of Tecklenburg.

CAPPENBERG, a town of Germany, in the circle of Westphalia, and bishopric of Munster; 6 miles N.W. of Werne.

CAPPENDU, a town of France, in the department of the Aude, and chief place of a canton in the district of Carcassonne; the place contains 586, and the canton 4644 inhabitants: the territory comprehends 167½ kilometres and 11 communes.

CAPPEROL CORONDE, a name given by the Ceylonese to a peculiar kind of cinnamon, esteemed the third in value: this has a very strong taste and smell of camphor, and its name with the natives signifies camphorated cinnamon. The tree which produces it, grows very plentifully in many parts of the island of Borneo, but it is not met with in the eastern parts of it. This is often sold to the Danes and English who come to trade on the coasts of Coromandel; it is prohibited exportation from the island, but so long as only one port is open, there are people enough who will carry out great quantities of it.

There is a species of canella very much resembling this kind of cinnamon-tree, which grows very frequently on the continent of India toward Goa; and another canella or wild cinnamon on the coast of Malabar, in many respects resembles this. The barks of all these trees are greatly inferior to the true cinnamon in smell, taste, and virtue; yet they are too often sold to the less judicious traders in these things, either alone or mixed with the several better kinds of cinnamon, to the great damage of all that afterwards buy them. Phil. Trans. N° 409.

CAPPERONNIER, CLAUDE, in *Biography*, a learned philologist, was born at Montdidier, in Picardy, in 1671. After having acquired, by his own study, the rudiments of the Latin tongue, he prosecuted his studies for 18 months at the college of Montdidier, then at the Jesuits' college of Amiens, and last of all in a seminary at Paris. Having taken orders, and supported himself by the profits of a small benefice, and by teaching the classics, he obtained the patronage of M. Cossion, who had been his pupil, and in 1706 was admitted into his house, where he continued ten years, applying with great assiduity to the study of the Greek authors. Declining the offer of a Greek professorship in the university of Basil, he determined, in 1710, to undertake the education of the children of M. Crozat, and continued in his family to the close of his life. In 1722, he was nominated professor of Greek in the royal college of Paris, and on his introduction to this office he delivered a Latin oration on the use and excellence of the Greek language, which was much applauded. In 1725 he published an excellent edition of "*Quintilian*" in folio, for which he received a pension from the king, to whom

whom it was dedicated. Burman rudely criticised it; but the editor defended it with politeness and modesty. In 1719 he printed "An Apology for Sophocles," as a reply to the criticisms of Voltaire on the Oedipus of this tragedian. He died in 1744, leaving a character of amiable simplicity, great piety and probity, and singular benevolence and kindness. He was distinguished by a very retentive memory. Among various works which he left for the press were an edition of the "Antiqui Rhetores Latini," with notes and illustrations, published at Strasburg in 1756, 4to.; and "Philological Observations" on Greek and Latin authors, which would amount to several volumes in 4to. He also completed a "Treatise on the ancient Pronunciation of the Greek language," and made great additions and corrections to Stephens's Latin Thesaurus.

CAPPERONNIER, JOHN, the relation of the former, and his successor in the Greek professorship, published an edition of "Cæsar's Commentaries," 2 vols. 12mo. 1755, and of the "Comedies of Plautus," 3 vols. 12mo. 1759. He died at the age of 59, in 1775. Nouv. Dict. Hist.

CAPPERS, a denomination given in our statutes (13 Eliz. c. 19. A. D. 1571) to the knit-cap makers, who manufactured caps of wool, and who obtained encouragement in opposition to those who made hats of felt, and who imported foreign materials for this purpose. But knit-caps have been long since disused.

CAPPONI, or CAPPONIO, JOHN BAPTIST, in *Biography*, a physician, poet, and astrologer, was born at Bologna in Italy, in the early part of the 17th century. He taught philosophy and medicine at Bologna, where he published, under the name of Charisius Thermarius Spado, "Animadversiones in Joannis Caroli Sorcii Opusculum de Febribus." After his death, which happened Nov. 16th, 1676, the following were printed: "Lectiones Physicæ Morales;" "De Morbis particularibus;" "De Humano Semine nequaquam animato;" "De Erroribus Clarorum Virorum Latinorum;" "Paradoxon Philosophiæ Democraticæ." He is said to have meditated, and in part executed, a general history of medicine, but it was never published. Eloy. Dict. Hist.

CAPPOQUIN, in *Geography*, a small town of the county of Waterford, province of Munster, Ireland, situated on the river Blackwater, which here takes a southern direction, and becomes navigable. There is a wooden bridge here over the Blackwater, which was rebuilt at the expence of the southern counties in the reign of Charles II. and which is now almost impassable. The ruins of the castle are near the bridge, and the whole town appears neglected and going to decay, notwithstanding its advantages for trade, and the richness of the adjoining country. The road from this to Lismore is remarkably beautiful; and the prospects from the high grounds above the town can scarcely be surpassed. It is 98 Irish miles S.W. from Dublin, and 5 miles east of Lismore. N. lat. 52° 9'. W. long. 7° 53'. Smith's Waterford, &c.

CAPRA, in *Astronomy*, a denomination given to the star Capella; and sometimes also to the constellation Capricorn. Some represent *Capra*, or the *she-goat*, as a constellation in the northern hemisphere, consisting of three stars, comprised between the 45th and 55th degree of latitude. The poets say, it is Amalthea's goat, which suckled Jupiter in his infancy. Horace, making mention of it, calls it, *Infans sidera Capræ*.

CAPRA, MARCELLUS, in *Biography*, a native of the island of Cyprus, where he appears to have practised medicine during the early part of his life. Induced at length to quit his native country, he went to Messina, where he soon became so distinguished as to be appointed by the magistrates physician

to the city. This happened about the year 1570. He was author of several abstruse, metaphysical works, suiting the humour of the time; but what alone seems deserving notice, is his account of a fatal epidemic prevailing in the island of Sicily, during the years 1591 and 2. "De Morbi Epidemici qui miserrime Siciliam depopulabat Anno 1591 itidemque 1592, Causis, Symptomatibus, et Curatione," Messanz, 1593, 4to. Haller Bib. Med. Eloy. Dict. Hist.

CAPRA, in *Geography*, a small Greek island, N.W. of the isle of Stancho, inhabited only by goats, as its name imports.

CAPRA, in *Zoology*, a genus of the *Mammalia* class in the order *Pecora*.

The quadrupeds of this tribe have the horns hollow, turning upwards, and bent back, compressed, and rough: front teeth in the lower jaw eight: canine teeth none: clin bearded.

These are the goats of English writers, including our common goat, and its numerous varieties. The species of this genus already ascertained are few, amounting only to two, or three at the utmost, if the domesticated goat, *Capra hircus*, be considered as the genuine offspring of either of those species known in a state of nature at this time. It is thought by many, and the opinion is highly probable, that our common goat originated from the *Caucasian ibex*, *Capra agagrus*, or perhaps from the *Ibex goat*, *Capra Ilex* of Linnæus. We can say but little as to the third species that might have been the parent stock of our present race of domestic goats, the *Capra caucasica* of Gmelin described in the Transactions of the Russian Academy for the year 1779; because it appears rather doubtful whether we ought to admit it as a species altogether distinct from *capra agagrus*, or not.

In the twelfth edition of the *Systema Naturæ*, the *capra* genus will be found far more extensive; Linnæus having classed several animals of the antelope tribe as species of this genus. The Swedish naturalist was unquestionably justified in this respect, both by his own opinion, and by the example of ancient writers with scarcely an exception from the time of Pliny. They had, for instance, uniformly considered the chamois as appertaining to the race of goats; it was their *rupicapra*, and even to this day it passes under the trivial name of the chamois goat, though in the systematic writings of modern zoologists it classes in the genus antelope. That the natural generical distinctions, if they may be so expressed, observable between the goat and the antelope tribes did not strike the mind of Linnæus may be presumed as evident; there was but an inconsiderable number (about six species) of the antelope known in his time, and those he placed without hesitation with the goats in his genus *capra*.

The observations of later naturalists prove sufficiently that Linnæus might have separated the goats from the antelopes with much propriety: were we to distrust the truth of this assertion, the writings of Pallas, of Schreber, Erxleben, Gmelin, Pennant, and Sonnini must silence every doubt. Gmelin, the editor of the last edition of the *Systema Naturæ*, has availed himself of these recent authorities, the antelopes are separated from the goats under the generic name of antelope, the goats retaining the original appellation of *capra*.

A principal distinction between the two genera consists in the structure of the horns, those of the antelope being round and nearly cylindrical, and either twisted spirally, or annulated: the teeth are exactly the same in both; but the chin of the goat is bearded, while that of the antelope is not. A further very striking difference between the goat and the antelope is observable in the general figure of these animals. The goat is robust, strong, vigorous, petulant, and

and fearless; the antelope is of a graceful form: its limbs long and slender: its disposition timid, harmless, active, and watchful; and in the chase, when pursued on the open plains, its course incomparably more swift than that of the goat.

Besides, therefore, the peculiar structure of the horns, and other characteristic particulars laid down by systematic writers, the manners and habits of life sufficiently prove that a line of separation ought to be drawn between the antelope and the goat. Mr. Pennant in his preface to the Synopsis of Quadrupeds treats on this subject at some length: his remarks are useful, and although they relate more immediately to the antelope than the goat, the leading points of his argument may be properly noticed in this place.—“The antelopes (says this author), two or three species excepted, inhabit the hottest parts of the globe; or at least, those parts of the temperate zone that lie so near the tropics as to form a doubtful climate. None, therefore, except the Saiga, and the chamois, are to be met with in Europe; and notwithstanding the warmth of South America is suited to their nature, not a single species has yet been discovered in any part of the new world. Their proper climates seem, therefore, to be those of Asia and Africa, where the species are very numerous.”—“As there appears a general agreement in the nature of the species that form this great genus, it will prevent needless repetition to observe, that the antelopes are animals generally of a most elegant and active make; of a restless and timid disposition; extremely watchful; of great vivacity; remarkably swift and agile, and most of their boundings so light, so elastic, as to strike the spectator with astonishment.”—“Antelopes generally reside in hilly countries, though some inhabit plains; they often browse like the goat, and feed on the tender shoots of trees, which gives their flesh an excellent flavour. This is to be understood of those which are taken in the chase; for those which are fattened in houses are far less delicious. The flesh of some species is said to taste of musk, which perhaps depends on the qualities of the plants they feed upon.”—“This preface (says Pennant) was thought necessary, to point out the difference in nature between this and the goat kind, with which most systematic writers have classed the antelopes: but the antelope forms an intermediate genus, a link between the goat, and the deer; agreeing with the former in the texture of the horns which have a core in them and are never cast; and with the latter in elegance and swiftness.”

From the tenor of the preceding observations it will be perceived that the latest and best informed zoologists consider it as a decided point that the antelopes and the goats ought to be separated, and we shall therefore speak of the species of Capra as they stand independent of the genus antelope.

CAPRA Ibex. Horns on the upper surface knotty, and bending over the back: throat bearded. Briss. reg. an.—Linn.

Ibex of Pliny, Gesner, Aldrovandus.—*Ibex alpinum sibiricarum*, Pallas.—*Capra alpina*, &c. Girtanner.—*Steinbock*, Gesner.—*Bouquetin*, Buffon, Sonnini, &c.—*Ibex goat*, Pennant.

Steinbock is the familiar title, by which this animal is better known than any other. The name is derived from the German *stein* and *bock*, or buck of the rock, conveying at once an idea of the animal, and the situations in which it delights, and is commonly found. The French name bouquetin is of German origin, and in England the species is better known by the name of steinbock, than that of ibex goat, as it is called by Pennant. In its general appearance it resembles the common goat, but it is considerably larger,

more vigorous, and more active. The colour is a deep hoary or greyish brown; much paler, or whitish beneath, and on the insides of the limbs; the outsoles of which are dusky, or blackish on the lower part: the back is marked with a distinct black line. The body is robust; the head short, small and compressed; the eyes are small, but full of fire and expression. The horns in the male are extremely large, measuring from two to three feet in length, and weighing eight or ten pounds; they are of a livid blackish colour, and are marked on the upper surface with transverse protuberant semicircles, which it is reported indicate by their number the age of the animal, one additional being formed every year. These horns are thick at the base; and sometimes become so prodigiously large as to extend the whole length of the body. The female is smaller than the male: her horns are smaller in proportion, less distinctly marked with semicircular protuberances, and much weaker than those of the male. The legs are short, but the males are very stout, and the hoofs short. The tail is small and of a blackish colour. The young steinbocks are of an ash-coloured grey.

The ibex is found in several parts of Europe and Asia, and it is said on all the great chains of mountains in the northern parts of the ancient hemisphere, upon the Alps, the Pyrenées, the Apennines, and Tyrol. In Asia it occurs on the summits of the chain of mountains extended from Taurus, and continued between Eastern Tartary and Siberia. It also inhabits the tract beyond the Lena, and is said by Virey to be a native of the mountains of Kamtschatka. In Arabia it is not uncommon, and in the high mountains of the island of Crete it appears to be abundant.

In its general habits or manners this animal resembles the common goat, but possesses every attribute of strength and activity in a degree proportioned to its natural state of wildness. It inhabits the most inaccessible places among rocks and precipices in the highest regions of the mountains, where it finds all that is necessary for its frugal subsistence in the midst of solitude and security. Sonnini observed them on many of the loftier elevations of the mountains in the isle of Candia, and several other islands in the same sea, and beyond the upper half of Mount Olympus he found there were hardly any quadrupeds to be seen, except a few bears, and the bouquetins, or mountain-goat, capra ibex, who appeared to be sole masters of this solitary waste of nature.

The chase of the steinbock, like that of the chamois, is both difficult and perilous. When it retreats among the crags and precipices it is impossible to pursue the animal in safety; the chase is then left to the dogs who are taught to hunt them over the most tremendous passes of the mountains amidst ice and snow, where many of the dogs are sometimes lost in the vain attempt to follow or overcome their game. But should the mountain huntsman once get sight of the steinbock at a distance from his dogs and within the range of his rifle piece he instantly takes an aim, and seldom fails to wound or kill the animal at the first fire. It is in this manner they hunt both the steinbock and the chamois on the Tyrolese mountains. The flesh of the young ibex is said to be in esteem as an article of food: that of the old ones is also eaten, and its fleece and skin employed for various purposes. We may farther add that this is the animal whose blood was formerly considered as a valuable article in the materia medica, being celebrated for its supposed power of relieving pleuritic and many other complaints. Of its wonderful virtues in this way much has been related in the works of Gesner and Aldrovandus. Its period of gestation is five months as in the common goat.

CAPRA.

CAPRA Ægagrus. Horns carinated, and arched back; throat bearded. Pallas. S. G. Gmelin.

Chevre sauvage, Tavernier. *Caucasian ibex,* Pennant. *Steinbock,* Ridinger.

The caucasian ibex is considerably superior in size to the common goat, and its form, in some degree, resembles that of the stag. According to Pallas, who describes this animal with accuracy, the general colour of it is greyish, intermixed with rusty, or ferruginous above, and white beneath. The forehead nearly black, which colour is continued in a narrow stripe along the middle of the back to the tail. The chin is furnished with a large beard of a dusky colour mixed with chestnut. The horns, which are very large and bend considerably backwards, are smooth, black, sharply ridged on their upper part, and hollowed on the exterior side; they have no appearance of either knots or rings, but are marked on the upper surface by some obscure undulations or slight wavy wrinkles: they are about three feet in length, and stand close at the base, about a foot distant at the widest part; and eight or nine inches at the tips. The female has either very short horns, or is entirely destitute of them, and has no beard.

In point of strength and agility this species is at least equal, if not superior to the common steinbock. Monardes compares it to the he-goat. It inhabits the lower mountains of Caucasus and Taurus, almost all Asia Minor, and may probably extend even to India. It abounds on the inhospitable hills of Laar and Chorasan in Persia, and according to Monardes, it is likewise found in Africa. Mr. Pennant is inclined to believe that it may exist in Crete, and even on the Alps, grounding his idea on a figure in one of the works of Ridinger, which seems intended for the same animal. Monardes assures us he was an eye witness to the manner in which this animal saves itself from injury by falling upon its horns from a considerable height; for he saw the animal he describes leap from a high tower, and precipitating itself on its horns, spring up again, and leap about without having to all appearance received the slightest injury. In the stomach of this animal, as in some of the antelopes, and other quadrupeds, is found the animal concretion, called bezoar, the once highly valued alexipharmic, the pretended medicinal virtues of which have been long since exploded.

CAPRA Caucasica. Horns turned backwards, and outwards, verging inwards at the tips, slightly triangular, and knotty before. Gmelin. Gmelin. Gmelin.

This animal, which Pennant includes in his description of the caucasian ibex (*capra ægagrus*) as a variety, ought, according to Gmelin, to be considered as a distinct species. In size it nearly corresponds with the domestic goat, but is broader and shorter, and the horns of the male are much larger in proportion, being sometimes more than two feet in length. The horns of the male are darker than in the female. The colour of the animal is a ferruginous or brownish grey above, with a subfuscous spiral line: beneath white: extremities black. The hair is cinereous at the base, rigid, and intermixed with wool.

Capra caucasica inhabits the bare schistous summits and cliffs of Mount Caucasus near the origin of the Terek and Cuban rivers. They couple in November, the female brings forth her young in April.

CAPRA Hircus, the common, or domestic goat. Horns carinated, arched, with a curvature outwards at the extremities.

Capra Hircus, β Linn.—*Capra, hircus, boeod.* Pliny, Aldrovandus, &c. *Caper hispanicus*, Jonst. Τεζυος and Αργες. Arist. &c.—*Bouc et chevre*, Buffon, &c.—*Becco, capra*, Ital.—*Bock et Geyss*, Germ.—*Domestic goat*, Engl.

"The origin of the domestic goat (says Mr. Pennant in his British Zoology) is the steinbock, ibex, or wild goat, a species now found only in the Alps, and in Crete." The facts already related in the history of *capra ibex* clearly prove the writer to be mistaken in asserting it to be found only in the Alps and in Crete; the observation is merely introduced to shew that he believes the ibex to be the parent stock from which the domestic goat originated.

To ascertain the point in a satisfactory manner is perhaps impossible: we must allow our opinions to fluctuate, between probabilities and possibilities without conceiving in our own minds the chance of arriving, with any absolute share of certainty, at the real truth. Pallas allows that *capra ibex* may have been the original from which the domestic goat is derived, at the same time that he is inclined to think with equal probability it may have derived its origin from *capra ægagrus*, the caucasian ibex of Pennant. The latter notion seems most prevalent; Gmelin adopts it; and we are led to think on a point so ambiguous, not entirely without reason.

Buffon considers the *capra ibex*, the chamois antelope, and the domestic goat, as one and the same species. He speaks of it as likely that the male ibex coupling with the female chamois may have given rise to the present domestic race of goats.—"There are many cases (says this lively writer in another place) in which we cannot distinguish characters, nor pronounce on differences with certainty: there are others in which we are obliged to suspend our judgment and opinions; and in a great number of others we have not the slightest ray of light to direct us; for independent of the uncertainty arising from the contrariety of assertions relative to recorded facts: independent of the doubts resulting from the inaccuracy of those who have endeavoured to observe nature, the greatest obstacle to the advancement of knowledge is our ignorance of a great number of effects which time has not disclosed to us."—"We are ignorant whether the chamois goat be any thing more than the common goat in a wild state, or whether an intermixture would not form an intermediate race."—The naturalists of France, though proud of their immortal Buffon, cannot accede to this inconsistent flight of his imagination. Sonnini, the editor of the last edition of his works, speaks of it as erroneous. Another French writer is more explicit: "It is absurd (he thinks) to suppose with Buffon that our race of domestic goats were produced from an intermediate breed between the bouquetin (*capra ibex*) and the chamois; an inspection of the exterior characters, and the internal organization of the three animals, to say nothing of their manners of life, seems to destroy all ideas of their being specifically the same." That the present race of goats cannot be the lineal offspring of the cross breed between the ibex and the chamois, as Buffon thought, seems unquestionable; yet we think it pretty certain, from the evidence above adduced, that they may be the descendants of *capra ibex*, or bouquetin, and in that case that the dissimilitude between the internal organization of the *capra ibex* and that of the common goat cannot be so very apparent as our author pretends. This is an interesting point for the comparative anatomist to determine. An account was published in the French *Journ. de Phys.* for October 1786, to prove that the *capra ibex* sometimes couples with the domestic goat, and produces mongrels. The fact was ascertained by M. Berthoud van-Berchem who saw an instance of it in the Valais, where the inhabitants rear numerous herds of tame goats, and the bouquetin is found in a state of nature among the mountains. It was long before well known that the goat will couple with sheep, the hybrid produce of which differs very little from the natural

offspring

offspring of the ewe and ram, except in having a hairy instead of woolly fleece. We have yet to learn that an intermixture of the goat and sheep may be productive of a breed of *fertile mules*, as Buffon seems to think very possible.

The history of the common goat has been very amply treated on by many writers, so that we can do little more than repeat the observations of others in this place.

The goat, in its domestic state, is found in almost every part of the globe, bearing the extremes of heat and cold, and differing in form according to various circumstances. It appears to have been originally confined to the old world, from whence it was transported to America. P. Browne seems to intimate that it is an aborigine of the island of Jamaica, but this is improbable: it is believed on very sufficient authority that it was entirely unknown to the Americans till after the discovery of America, when it was introduced by the Europeans.

This animal, observes Buffon, is superior to the sheep both in sentiment and dexterity. He approaches man spontaneously, and is easily familiarized; he is sensible of caresses, and capable of a considerable degree of attachment; he is stronger, lighter, more agile, and less timid than the sheep; he is a sprightly, capricious, wandering, wanton animal. It is with much difficulty that he can be confined, and he loves to retire into solitude, and to climb, stand, and even sleep on rugged and lofty eminences; he is robust, and easily nourished, for he eats almost every herb, and is injured by very few; his bodily temperament, which in all animals has a great influence on the natural disposition, is not essentially different from that of the sheep. These two animals, whose internal organization is almost entirely similar, are nourished, grow, and multiply in the same manner; and their diseases are the same, excepting a few to which the goat is not subject. The goat fears not, like the sheep, too great degree of heat; he cheerfully exposes himself to the sun, and sleeps under its most ardent rays without being affected with the vertigo, or any other inconvenience; he is not afraid of rain or storms; but he appears to feel the effects of severe cold. The inconstancy of his disposition is marked by the irregularity of his actions. He walks, stops short, runs, leaps, approaches, or retires, shews, or conceals himself, or flies off as if actuated by mere caprice, and without any other cause than that which arises from an eccentric vivacity of temper; the suppleness of his organs, and the strength and nervousness of his frame, are hardly sufficient to support the petulance and rapidity of his natural movements.

When pastured along with sheep, goats always take the lead of the flock. They love to feed separately on the tops of hills, and prefer the most elevated and rugged parts of mountains. They find sufficient nourishment in healthy, barren, and uncultivated grounds. They do infinite mischief when permitted to go among corn, vines, copses, or young plantations; for they eat with avidity the tender bark, and young shoots of trees, which generally proves fatal to their growth. They carefully avoid moist ground, marshy meadows, and rich pastures. They are seldom reared in plain countries, where they never thrive well, and where their flesh is always bad.

The male goat is capable of engendering when he is a year old, and the female at seven months. But as the fruits of their early coupling are generally weak and defective, they are commonly restrained till they be eighteen months, or two years old. The he-goat is handsome, vigorous, and ardent, and one is sufficient to accompany an hundred and fifty females for the space of two or three months; but his ardour, which soon consumes him, does not last more than three or

four years, and by the age of five or six, he becomes nearly enervated. In the selection of a he-goat for propagation, attention should be paid to his strength and age; he should be large, and about two years old; his neck short and fleshy; his head slender; his ears pendulous; his thighs thick; his limbs firm; his hair black, thick, and soft; and his beard long and bushy. The choice of the female is of less consequence, observing only, that those with large bodies, thick thighs, who walk light, have large udders, and soft bushy hair, are the most preferable. They are in season from September to the end of November, though they will couple and produce young at all times. The smell of the goat is highly unpleasant, that of the male especially. During the months of September and October, the whole atmosphere around them is filled with their strong disagreeable odour, and which, though as disgusting as *asafœtida* itself, in the idea of some naturalists, may perhaps be conducive to the prevention of many distempers, and to cure those of a nervous and hysterical kind. Horses are supposed to be much refreshed with it, on which account, many people keep he-goats in their stables or stables.

The female produces one kid, sometimes two, very rarely three, and never more than four: she carries her young five months, bringing them forth about April; and is in condition to breed from the age of seven months, till she is seven years old. The he-goat, as before said, will propagate as long, if proper care be taken of him, but otherwise becomes useless two or three years sooner. He is then sent to fatten among the common herd. The strong smell of the goat does not proceed, it is said, from his flesh, but his skin. These animals are seldom permitted to grow old, or perhaps they might live eleven or twelve years; but it is usual to fatten and kill them as soon as they cease to multiply, because the older they are the worse is their flesh. The goats are animals that cost very little for their food, and in cold, mountainous countries are attended with considerable advantage: their flesh, tallow, hair, and skin, are all valuable commodities. Their milk is said to be more wholesome and better than that of the sheep; it is used in medicine, curdles easily, and makes very good cheese. The females, says Buffon, will allow themselves to be suckled by infants, to whom their milk affords very excellent nourishment. "Like cows and sheep, (continues this writer) they are suckled by the viper, and also by the bird called in France *l'engoulevent*, (the goat-sucker,) which fastens to their teats during the night, and, as some say, makes them lose their milk for ever after." It may be almost superfluous to point out the absurdity of this whimsical idea, founded, as we must believe, on the grossest prejudices of rustic ignorance; this notion is certainly entertained among the lower class of peasantry, both in our own country and in France. It is a matter of surprise to many, that Sonnini in his edition of Buffon's works, has not endeavoured to correct this error, or explain it to our satisfaction. The readiness with which the female goat will allow herself to be suckled by other animals, is indeed well known. Of this, Sonnini has given a very striking instance; he assures us that in the year 1780, he saw a foal which had lost its mother, nourished by a goat, which during the process, was placed on a barrel, in order that that the foal might suck with the greater convenience. The foal followed its nurse to pasture, as it would its parent, and was attended with the greatest care by the goat, which always called it back by her bleatings when it wandered to any distance from her.

The colour of the goat is various, being either black, brown, white, or spotted. Those of Wales Mr. Pennant thinks far superior in size, strength, and fineness of the hair,

to those of other mountainous countries; the goats of France, and the Alps, being generally short-haired, reddish, and small-horned; while the horns of the Cambrian he-goat have been seen three feet two inches long, and branching three feet asunder between the tips. "The suet of the goat is in great esteem, as well as the hair. Many of the inhabitants of Caernarvonshire suffer these animals to run wild on the rocks during winter as well as summer; and kill them in October, for the sake of their fat, either by shooting them with bullets, or running them down with dogs, like deer. The goats killed for this purpose are about four or five years old. Their suet will make candles, far superior in whiteness and goodness to those made from that of the sheep or the ox, and accordingly brings a much greater price in the market: nor are the horns without their use; the country people making of them excellent handles for tucks, and penknives. The skin is peculiarly well adapted for the glove manufactory, especially that of the kid: abroad it is dressed and made into stockings, bed-ticks, bolsters, bed hangings, sheets, and even shirts. In the army it carries the foot-soldier's provisions. As it takes a dye better than any other skin, it was formerly much used for hangings in the houses of people of fortune, being susceptible of the richest colours; and when flowered and ornamented with gold and silver, became an elegant and superb furniture." "The flesh is of great use to the inhabitants of the country where it resides, and affords them a cheap and plentiful provision in the winter months, when the kids are brought to market. The haunches of the goat are frequently salted and dried, and supply all the uses of bacon: this by the natives is called *coch yr awden*, or hung venison."—"The meat of a splayed goat of six or seven years old (which is called *hyfr*,) is reckoned the best; being generally very sweet and fat. This makes an excellent patty; goes under the name of rock venison, and is little inferior to that of the deer. Thus nature provides even on the tops of high craggy mountains, not only necessities, but delicacies for the inhabitants." Penn. Brit. Zool.

The above passages are selected from Pennant's description of the Cambrian goats, as they contain much useful information. It should, however, be mentioned, that those observations were written above thirty years ago, and are not in every particular applicable to the present state of things in Wales, where English manners, and English husbandry are making rapid innovations. The goat is an animal, we may strictly say from our own very recent observations, but sparingly cultivated at this time in the principality. The culture of this useful animal has been on the decline for the last twenty years, and is now almost wholly confined to the mountainous parts of Caernarvonshire: a small breed of sheep that thrive admirably well on the mountains, where goats were formerly kept, have superseded them: the rearing of cattle, and especially sheep, is considered more beneficial and respectable by the modern Welsh farmer. We have observed goats in greater numbers among the tremendous cliffs that overlook the pass of Pont-Aberglaslyn, than in any other parts of North Wales. In South Wales the goat is seldom seen.

The skin of the goat is readily converted into parchment, and it is also frequently used by the leather dressers for making what is termed Morocco leather: the best skins for this purpose are those of the Corsican breed of goats. The manufacturer, we also learn, can imitate the chamois leather so exactly with the skin of the goat, that the difference is scarcely to be discerned.

CAPRA Angorensis, γ. Body covered with very long, pendulous, spirally curled hair.

Capra Angorensis, Haffelq.—*Chèvre d'Angora*. Buffon, &c.—*Angora goat*, Pennant, &c.

The Angora goat is in general of a beautiful milk-white colour, with short legs, and black spreading spirally twisted horns. The hair on the whole body is disposed in long pendulous spiral ringlets; its ears are pendulous, and the horns of the female, instead of divaricating, as in the male, turn backwards, and are much shorter in proportion.

In its native country this animal is highly valued, and with sufficient reason, for it is a source of riches to its cultivators; the finest, and most costly robes of the highest classes in Turkey being fabricated of its silky fleece: the price it bears is very great. Most of the European nations have agents for purchasing the valuable wool of this animal, which the Turks, it is reported, will not allow to be sent out of their empire in a raw state, but in the form of thread; a multitude of the poorer orders obtaining a livelihood by spinning it. The most considerable manufactory of camlets, fabricated with this wool in Europe, appears to be those of Lille and Amiens, in France. In order to preserve this beautiful hair in good condition, the goat herds of Angora are peculiarly careful of their flocks, washing and combing them with the greatest diligence; and it is said that a change of pasture frequently makes them lose their beauty; this variety being naturally confined to narrow bounds, and produced only in the tract surrounding the towns of Angora and Beibazar, two places situated in a small district of Asia Minor, not far from Smyrna, and remarkable for producing a peculiar race of sheep, cats, and rabbits, as well as goats, with hair of uncommon length and fineness.

CAPRA Mambrica, δ. Horns reclining; ears pendulous; chin bearded.

Capra Mambrica, Linn.—*Capra Syriaca*, Briff.—*Geyssen mit hangenden Ohren*, Ranwolf.—*Chèvre Mambrine*, ou *chèvre du Levant*, Buff.—*Syrian goat*, Penn.

This variety of goat takes its name of Mambrica from a particular mountain, called Mambre, or Mambra, situated in the middle part of Palestine, near the river Hebron, where they abound. The variety is common in many parts of the East, and is principally distinguished by the great length of the ears, which are pendulous, and sometimes reach so low as to incommode the animal while feeding. It is reported by travellers, that the owners of these animals, on such occasions, cut off one of their ears that they may feed with greater ease. This, however, is denied by Sonnini and other French writers, who assure us that the ears of this goat never reach so low as the ground, and are never cut off. Its general colour is reddish, with short blackish horns. This is the common goat of Aleppo, the inhabitants of which it supplies with milk. The same is the case at Cairo, where these goats are driven in small flocks every morning through the different quarters of the city, and every one sees taken from them the quantity of milk they want.

CAPRA Depressa, ε. Horns small, depressed, and closely incumbent to the skull.

Capra depressa, Linn.—*Capra parva Americana*, &c. Briff.—*Bouc d'Afrique*, Buff. &c.—*African goat*, Penn.

This is a small variety, or dwarf kind of goat, found in some parts of Africa. The French call the male bouc d'Afrique, and the female, la chèvre naine. This kind has rough hair, and extremely short horns, which are very thick, triangular, and lie close to the head; in the female they are still shorter. Dr. Shaw observes, that Linnæus seems to have entertained an erroneous idea relative to the native country of this variety, and to have supposed it an American animal. We may add, that although the animal was originally a native of Africa, it has been long since transported

ported to America, where it thrives well, and seems to have undergone no other alteration from the effect of its new climate, than in becoming somewhat more diminutive in size.

CAPRA Reverfa, ζ. Horns erect, and recurved at the tips. Linn.

Ilex parvus Americanus, Briff.—*Bouc de Juda*, *Chèvre de Juda*, Buff.—*Whilaw goat*, Penn.

Herd of this species of goat are cultivated in most parts of Upper Egypt. This is a dwarf variety, found in various parts of Africa. It is said to be also very common in Guinea and Angola. The flesh is considered as an excellent food.

There is a variety of this kind with longer horns; the hair is long and silky, and the whole animal bears some resemblance to a small Angora goat. Buffon describes it as being considerably larger than the other, measuring two feet nine inches in length; while the other was only twenty-four inches long. Buff. Suppl. pl. 13.

CAPRA Capricornus, n. Horns short, turned forwards at the tips, and annulated at the sides.

La capricorne, Buff.—*Capricorn goat*, Penn.—*Capricorn goat*.

A variety described by Buffon from a skeleton with the horns, preserved in the king's cabinet at Paris. The animal is supposed to be a native of Africa. In the form and proportion of the bones, Buffon tells us it bears a perfect resemblance to the domestic he-goat; and the figure of the under jaw is the same as that of the wild goat; but that it differs from both in the horns; those of the wild goat having prominent tubercles or knobs, and two longitudinal ridges, between which there is a well marked anterior face: those of the common goat have but one ridge, and no tubercles. The horns of the capricorn have but one ridge, and no anterior face; and though they want the tubercles, they have rugosities, which are larger than those of the male domestic goat. These differences, adds Buffon, seem to indicate an intermediate race between the wild and domestic goat; and, besides, the horns of the capricorn are short and crooked at the point, like those of the chamois; and at the same time are compressed and ringed; and hence, they seem to partake at once of the he-goat, the wild goat, and the chamois. This variety appears to be scarcely known, except from the description of it given us by Buffon.

CAPRA-COTTA, in *Geography*, an inconsiderable town of Naples, in the county of Molise, seated on an eminence; 13 miles N.W. of Molise.

CAPRA Salians, or *CAPRÆ Saltantes*, in *Meteorology*, a fiery meteor, or exhalation, which sometimes appears in the atmosphere; and is not fired in a straight line, but with inflexions, and windings in and out, resembling the caperings of a goat. The *capræ saltantes* are not so called from their figure, which is various, sometimes round, sometimes long, but, from their moving by jerks, somewhat like the leaps of that animal; and from the little languets of fire which hang at, and sometimes fall from them, which antiquity has been pleased to fancy like the beard or locks of a goat's hair. Aristotle distinguishes the *capra* from the *trabs*, in that the latter proceeds with an uniform motion, the former with an irregular one, and as it were by jumps. Arist. Met. lib. i. cap. 5. Mem. Ac. Infer. tom. vi. p. 95.

The *capræ* seem to be very low, yet sometimes fly so high, that meteorologists have placed them in the upper region, though not so constantly, but they are sometimes also found in the middle region. Of globular *capræ* we have divers instances, in ancient as well as modern naturalists. Such was the flame said by Seneca to have been seen in form of a huge ball, about the bigness of the moon, when Paulus

Æmilius waged war against Perseus. Such another, he tells us, was seen at the death of Augustus; another on the tragedy of Sejanus; another at the death of Germanicus. Such was that seen about Michaelmas, 1676, by no less than twelve counties at once; it is described by Mr. Nash, as it appeared near Seighford in Staffordshire, as of a globular figure moving by jerks, and making short rests at every one of them, letting fall drops of fire, which were parts of its body; for it decreased in magnitude the farther it went, and the oftener it dropped, till at length it wholly disappeared. Senec. Nat. Quæst. lib. i. cap. 1. Phil. Transf. N^o 135. p. 863, seq. Plott. Nat. Hist. Stafford. cap. i. § 40.

CAPRA Trituratoria, in *Ancient Husbandry*, was a kind of iron log, made in the figure of a goat, which was laid on the *tribula*, to make it more effectual in separating the corn from the ears, the ancient way of threshing.

CAPRAJA, in *Geography*, an island of the Mediterranean, situate between the coast of Italy and the northern part of the island of Corsica, about 6 leagues in circumference. This island is populous, though the soil is dry and mountainous. It is surrounded with rocks, except in one part, where is a good harbour, belonging to a town named Capraja. N. lat. 43° 15'. E. long. 11° 5'.

CAPRARIA, in *Botany*, goat-weed, (from *capra*, a goat, so called because goats are fond of the biffora, the best known species). Linn. Gen. 768. Schreb. 1030. Willd. 1169. Gært. 309. Juss. 118. Vent. ii. 357. Class and Order, *didynamia angiospermia*. Nat. Ord. *Personata*, Linn. Vent. *Scrophularia*, Juss.

Gen. Ch. *Cal.* one-leaved, five-cleft, oblong; segments linear, erect, distant, permanent, shorter than the corolla. *Cor.* monopetalous, bell-shaped, five-cleft, nearly equal; segments oblong, acute; the two upper ones more erect. *Stam.* filaments four, awl-shaped, inserted into the base of the corolla, and only the half of its length; the two lower ones rather shorter than the others; anthers heart-shaped. *Pist.* germ conical; style thread-shaped, longer than the stamens; stigma heart-shaped, (bilamellate, Gært. two-lobed, Juss.) two-valved, equal. *Capf.* oblong-conical, compressed at the tip, two-celled, two-valved; valves, when mature, bifid; partition doubled by the bending of the edges of the valves. *Seeds* numerous, roundish; receptacle adhering to the axis of the capsule, not to the partition; when mature, disunited.

Eff. Ch. *Calyx* five-cleft. *Corolla* bell-shaped, five-cleft, acute. *Capsule* two celled, two-valved, many-seeded.

Sp. 1. *C. biflora*, Linn. Sp. Pl. 1. Willd. 1. Mart. 1. Lam. Enc. 1. Gært. tab. 53. fig. 9. Lam. Ill. Plant. 534. fig. 2. "Leaves alternate; flowers in pairs." A shrub, three or four feet high. *Branches* long, erect, commonly smooth. *Leaves* about an inch and half long, but in the shade near five, alternate, sessile, oval-oblong, serrated in their upper half, smooth; on sandy coasts succulent, thick, and brittle. *Flowers* white, scentless, axillary, generally two together, sometimes three; peduncles simple, shorter than the leaves; calyx smooth, deeply five-cleft; segments of the corolla hairy at the base; anthers double; germ egg-shaped, furrowed; stigma headed, acute. *Capsule* furrowed on both sides, the length of the calyx. *Seeds* very small. A native of the West Indian islands, and the neighbouring continent, and one of the plants which the natives of the country use for tea. The *capraria peruviana* of Feuillé, (Per. i. p. 764. tab. 48.) which Linnæus conjectured to be this species, is a different plant, for which a distinct genus has been formed by Ruiz and Pavon, in their *Flora Peruvienfis*; but it differs from *capraria* only in having

five stamens. See *XUAREZIA*. 2. *C. crustacea*, Linn. Mant. p. 87. Mart. 3. (Caranas, Rumph. Amb. v. p. 491. tab. 170. fig. 3. *β*. *Capraria uniflora*. Burm. Fl. Ind. p. 133. tab. 14. fig. 3.) "Leaves opposite, egg-shaped, scolloped, on very short petioles." Stems herbaceous, much-branched, four or five inches high. Leaves opposite, rather acute. Flowers axillary and terminal; peduncles simple, longer than the leaves. Linnæus says that it resembles his *capparis gratioloides*, but that the leaves are more egg-shaped and petioled. Willdenow has omitted it. 3. *C. lucida*, Willd. 2. Mart. 6. Hort. Kew. ii. p. 353. "Leaves opposite, oblong, acute, sharply and minutely serrated, even; petioles winged; peduncles three-flowered." Whole plant smooth. Stems quadrangular, biennial. Leaves an inch and half long; petioles half an inch. Flowers axillary, a little longer than the petioles; exterior pedicels sometimes three flowered; bractes awl-shaped, the length of the pedicels; segments of the calyx awl-shaped, three lines in length; corolla salver-shaped; tube cylindrical, pale purple, a little longer than the calyx, gibbous on the outside at the base, a little bent above, then erect, a little elongated on the outside; border horizontal; segments egg-shaped, obtuse, equal, reddish purple, with a dark purple spot near the throat; throat hairy; anthers oblong, compressed; germ roundish; style shorter than the stamens; stigma large, convex, oblique. Hort. Kew. Willdenow observes that the fruit is a two-celled berry, as it probably is in all the Cape species, since they agree with it in the habit of the flower; and that, therefore, they may not improperly form a distinct genus. A native of the Cape of Good Hope: observed by Masson. Introduced at Kew, in 1774. It flowers in April and May. 4. *C. lanceolata*, Linn. jun. Supp. 284. Willd. 3. Mart. 4. Hort. Kew. ii. p. 354. "Leaves opposite, lanceolate, entire; racemes compound, terminal." Stem shrubby. Leaves two inches long and more, acute, stiff. Flowers in a terminal panicle, composed of short racemes. Found at the Cape of Good Hope by Thunberg and Masson. Introduced in 1774. 5. *C. semiferrata*, Willd. 4. Vahl. Eclog. ii. p. 47*. "Leaves lanceolate, serrated outwards; peduncles sometimes many-flowered." Stem herbaceous, erect, round below, angular above, interspersed with short hairs. Leaves two or three inches long, alternate, thick-set, spreading, narrowing at the base into the petiole, acute, smooth on both sides, serrated from the tip to the middle, then entire. Flowers axillary, and terminal; peduncles scarcely half an inch long, pubescent, from one to four-flowered; pedicels alternate, approximate, very short; bractes one at the base of each pedicel, linear-lanceolate, a little longer than the pedicel; segments of the calyx awl-shaped; corolla longer than the calyx, hairy at the bottom; segments five, linear-oblong; stigma capitate. Capsule oblong, a little longer than the calyx, two-furrowed, two-valved, splitting into two. Seeds numerous, very small, affixed to a linear, loose receptacle. Vahl. A native of St. Martha, in America. 6. *C. undulata*, Linn. jun. Supp. 284. Willd. 5. Mart. 5. Hort. Kew. ii. p. 354. L'Herit. Ser. Ang. p. 21. "Leaves opposite, oblong egg-shaped, entire, waved; upper ones somewhat heart-shaped, in whorls; racemes resembling spikes." Stem shrubby. Found at the Cape of Good Hope by Thunberg and Masson. Introduced in 1774. 7. *C. humilis*, Willd. 6. Mart. 7. Hort. Kew. ii. p. 354. "Pubescent; leaves opposite, or in threes, egg-shaped, serrated, petioled; peduncles axillary, shorter than the petiole." Root annual. Found in the East Indies by Dr. I. G. Koenig. Introduced in 1781, by sir Joseph Banks.

Propagation and Culture. The first species is propagated by seeds, which must be sown upon a hot-bed in the spring,

and to bring them forward should be afterwards planted upon another hot bed. About the middle or end of June they may be transplanted either into pots of rich earth, or into a warm border, where they will ripen their seeds in autumn in the open air. The Cape species may be increased by cuttings, and are less tender. Martyn's Miller.

CAPRARIA Gratioloides, (Linn.) See *LINDERNIA pyxidaria*.

CAPRARIA Durantifolia, (Linn.) See *STEMODIA durantifolia*.

CAPRARIA. (Linn. Hort. Cliff.) See *SCOFARIA dulcis*.

CAPRARIA. (Gron. Virg.) See *LECHEA minor*.

CAPRARIA, in *Geography*, one of the Tremiti islands, in the Adriatic, about 4 leagues from the coast of Italy; very small, and uninhabited. N. lat. 42° 10'. E. long. 15° 36'.

CAPRARIENSES, in *Ancient Geography*, an appellation given to mountains of Africa, in Mauritania, which were inaccessible, and also to the inhabitants of these mountains.

CAPRASIA, a town of Italy, in Brutium.—Also, the name given by Pliny to one of the mouths of the river Eridanus, or the Po.

CAPRATA, in *Ornithology*, a species of *MOTACILLA*, of a black colour, with the rump, vent, and spot on the wing-coverts white.

Inhabits the island Luzonia. Length four inches and a half. Bill black; legs black-brown. Called by Brisson *rubetra lucionensis*, *traquet d'isle de Luçon*, Buffon, and *Luzonian warbler*, Latham.

CAPREA, in *Zoology*. See *CAPRIOLUS* and *CERVUS*.

CAPREÆ, in *Ancient Geography*. See *CAPRI*.

CAPREÆ, in *Entomology*, a species of *PHALÆNA*, (Noctua). The wings flexuose, cinereous, with three oblique whitish streaks, and two stigmata. Inhabits Germany. Larva naked, green, and feeds on the willow.

CAPREÆ, that species of *APHIS*, that infests *salix caprea*. This is small, of a greenish colour, with pointed abdomen; and the eyes, antennæ, and tips of the legs black. Fabr. &c.

CAPREOLATE Plants, in *Botany*. See *CAPREOLUS*.

CAPREOLI, in the *Ancient Architecture*, a sort of rafters or timbers serving to sustain the *canterii*, either in buildings, or machines. They were thus called, not, as Philander imagines, from their resemblance to the *capreoli*, or tendrils of vines, but from the affinity of their form and office to wild goats; as these butt and repel things with their horns, so do the former oppose their heads or horns to the weight of the *canterii*.

CAPREOLUS, in *Botany*, a term used by the old botanists for a tendril, or clasper, called by Linnæus *cirrhus*.

CAPREOLUS, in the *Ancient Husbandry*, a kind of iron hoe or instrument with two forks or fangs, wherewith to stir and move the ground.

CAPREOLUS, in *Zoology*, a species of *CERVUS*, the roe of English writers. See *CERVUS*.

CAPRI, in *Geography*, anciently *CAPREÆ*, an island of the Mediterranean, about three Italian miles from the coast of Naples, about eight miles in circumference. Although it is so mountainous that its coasts are almost inaccessible, some parts of it are very fertile; and it abounds so much with various birds of passage, and more especially with quails, that the greatest part of the bishop's income arises from the taking of these and the hunting of other game. Hence this island has been called the "bishopric of quails." Swinburne, (Travels, vol. iii. p. 7.) informs us, that even in bad years the number of quails caught in this island

amounts to 12,000; and that in good years it exceeds 60,000. On the eastern summit of Capri are cliffs of stupendous altitude that overhang the channel, which separates this island from Cape Campanella, anciently called "promontorium Athenæum, or Minervæ." The island of Capri or Capræ is famous in history as a place often visited by the emperor Augustus both for health and recreation; and as the retreat of Tiberius, A. D. 27, who here abandoned himself to indolence, intemperance, and the most infamous debauchery. In this retired abode he spent a great part of ten years, secluded from the world, and wallowing in brutal debaucheries, the detail of which has been transmitted to us by many authors of unquestionable credit, although some of the practices which they recite seem to be incompatible with his advanced age and complicated infirmities: however, the obscene sculptures and medals, which have been dug up in almost every corner of the island, sufficiently prove that the charge against him is well founded. On the site of his summer palace now stands the hermitage of Santa Maria, commanding a most enchanting prospect. Tiberius, in order to vary his pleasures, and to enjoy the advantages as well as avoid the inconveniences of each revolving season, built twelve villas in different situations, dedicated to the twelve greater gods, of some of which the ruins are still to be seen. At Santa Maria are extensive vaults and reservoirs, and on an adjoining brow are the remains of a light-house; two broken columns indicate the entrance of the principal court. At the palace of La Marina, Tiberius had a winter residence; where columns and other fragments of architecture scattered on the sands remain as memorials of its splendour. A semicircular recess of net-work, the "opus reticulatum" of Vitruvius, raised against the cliff, seems to have been a part of the theatre; and the conduit that supplied the palace with water still exists. The ruins stretch far into the sea, which has now resumed the territory from which it had formerly been expelled by terraces and piers. Here the soil is richly vegetative, and composed of divers layers; a deep stratum of good mould covers a yellow bole, under which lies a stone exactly similar to the tufa of the volcanic hills round Naples. The palace was built with this stone, but in the abutments and back walls are inserted large pieces of lava in a rough state of torrefaction, like that of the crust of Vesuvian streams when cooled; yet the upper rocks of Capri are universally calcareous, and homogeneal with the strata of the Sorrentine mountains, of which they appear to have been a part till split asunder, and cast off by an earthquake that buried the intermediate grounds in the sea. These lower tracts in Capri have probably been thrown up by fire in the midst of lime-stone mountains, in the same manner as the plain of Sorrento. According to Dion Cassius, this island was wild and barren before the Cæsars took it under their protection; at this day a large portion of its surface is uncultivated and impracticable; but every spot that will admit the hoe is industriously tilled, and richly laden with the choicest productions of agriculture. The odium attached to the memory of Tiberius proved fatal to his favourite abode. Scarcely was his death proclaimed at Rome, ere the senate issued orders for the demolition of every fabric he had raised on the island, which, by way of punishment, was thenceforward destined to be a state-prison. The wife and sister of Commodus were banished to its inhospitable rocks, which were soon stained with their blood. In the middle ages Capri became an appendage of the Amalfitan republic, and, after the downfall of that state, belonged to the duchy of Naples. About a stone's throw from the south side of this island are two or three pointed rocks, the

"Scopuli Sirenum," mentioned by Virgil and Ovid in their description of Æneas's voyage.

"This isle," says Swinburne, "reunites such a variety of beauties and advantages, that it is a matter of wonder to me, why so few of our misanthropic countrymen resort to it; a man of an indolent philosophic cast would here be suited with a scene for meditation and solitary enjoyments; the temperature of the air and the excellence of the fruits would secure his health; and the delightful scenery round him would dispel his cares, and given an even cheerful flow to his spirits."

CAPRI, a town of the island above described, seated in a narrow, low, but delightful and fertile spot of land, between two rugged eminences, which form the extremities of the island, and appearing at a distance by its cupolas and buildings to be a considerable place, but on a nearer approach dwindling to a village. It is the see of a bishop, suffragan of Amalfi. It is 17 miles S. of Naples. N. lat. 30° 34'. E. long. 13° 58'.

CAPRI Portus, in *Ancient Geography*, a port of Macedonia, which, according to Mela, lay between mount Athos and the river Strymon.

CAPRIANUS Mons, a mountain of Sicily, in the vicinity of the town of Heraclea.

CAPRIATA, PIER-GIOVANNI, in *Biography*, an historian of Genoa, who flourished in the 17th century. His Italian history comprehends the transactions that occurred in Italy during his own time, which he has related with clearness, and with sagacity traced to their causes; maintaining at the same time, as he says, a perfect impartiality between the powers of France and Spain, that were concerned in them. The two first parts of this history were published by Capriata in his life-time, from 1613 to 1644; and the third part, extending to 1660, was published by his son after his death. The whole has been translated into English. Gen. Dict.

CAPRICCIO, *Ital.* a musical term for a wild, irregular movement, but full of fire and fancy. It is generally intended to display execution in the performance of new and singular passages, with the freedom of an extemporaneous flight. During the last century, the capricci of Vivaldi, Veracini, and Locatelli, were in high favour.

CAPRICE is applied, in *Architecture*, to an edifice of a singular taste, and deviating much from the common rules of building.

CAPRICERVA, in *Zoology*, one of the synonyms of *antilope cervicapra*; which see.

CAPRICKE, in *Geography*, a town of France, in the department of Escaut, and chief place of a canton, in the district of L'Ecluse. The place contains 3239, and the canton 14,049 inhabitants. The territory comprehends 125 kilometres and 8 communes.

CAPRICORN, the Goat, in *Astronomy*, a southern constellation and the tenth sign of the zodiac, from which also the tenth part of the ecliptic takes the same denomination. This was one of the 48 constellations received from the Egyptians by the Greeks.

The character whereby Capricorn is represented in astronomical writing, is ♑, or ⚄, of which the other is an imitation. The former is a kind of resemblance of the crooked horns of the goat, and the latter of the animal itself.

As to the figure of this constellation, the Greeks pretend that Pan, in order to avoid the terrible giant Typhon, threw himself into the Nile, and was changed into this figure; and that, in commemoration of this exploit, Jupiter took it up into heaven. But it is more probable, as Macrobius observes, that the Egyptians marked the portion of the heavens appropriated

priated to this sign, where the sun begins to ascend towards the north, with the figure of a goat, which is an animal that delights in climbing the sides of mountains.

The ancients accounted Capricorn the tenth sign, and when the sun arrived thereat, it made the winter solstice, with regard to our hemisphere; but the stars having advanced a whole sign towards the east, Capricorn is now rather the eleventh sign; and it is at the sun's entry into Sagittary, that the solstice happens: though the ancient manner of speaking is still retained.

The stars in the constellation of Capricorn, in Ptolemy's and Tycho's Catalogue, are 28; in that of Hevelius 29; though it is to be observed, one of those in the tail, of the sixth magnitude, marked in Tycho's book the twenty-seventh, was lost in Hevelius's time. Mr. Flamsteed, in the Britannic Catalogue, enumerates 51 stars in this sign.

It is represented on ancient monuments, medals, &c. as having the fore-part of a goat, and the hind-part of a fish; which is the form of an ægipan; and sometimes, simply, under the form of a goat.

For Dr. Herschel's account of the lustre and magnitude of the stars in Capricorn, see Phil. Trans. vol. lxxxvi. p. 199. 217. vol. lxxxvii. p. 299.

CAPRICORN, *tropic of*, a lesser circle of the sphere, parallel to the equator; passing through the beginning of Capricorn, and determining the winter solstice, or the point of the sun's greatest south declination. See TROPIC.

CAPRICORN beetle, in *Entomology*, the trivial English name of *Cerambyx longimanus*, which see.

CAPRICORN-goat, in *Zoology*. See CAPRA Capricornus.

CAPRICORNE, the name given by Buffon, and other French writers, to *Capra capricornus*, which see.

CAPRICORNUS, a variety of the goat, *Capra ægagrus*, with short horns, that turn forward at the apex, and are annulated at the sides. See CAPRA.

CAPRICORNUS *exiguus saltatorius* of Ray, is the Fabrician insect *Chrysomela hyoscyami*. *Mordella ovata cærulea nitida*, tibiis ferrugineis. Linn. Faun. Suec. 540.

CAPRICORNUS *niger cornutus*, Muf. Petrop. 652, is *Cerambyx batus* of Linnæus.

CAPRICORNUS *ruficus* of Petiver, the insect called by modern entomologists *Cerambyx ædilis*.

CAPRIFICATION, a name given in the islands of the Archipelago to a peculiar method of propagating and ripening the fruits of the domestic fig-trees, by means of insects. Plin. Hist. Nat. lib. xv. cap. 19.

M. Tournefort assures us, that this method is still practised every year in most of the Grecian islands; and he admired the patience of those who spent above two months in carrying the flies from one fig-tree to another. Caprification is formed from *caprificus*, the wild fig-tree, from whose fruits the insects are produced, which are the chief instruments of caprification. This tree bears three different species of fruit, called *ornites*, *cratirites*, and *orni*, which answer no other purpose but that of facilitating the above operation. The *ornites* appear in August, and contain little worms, hatched from eggs deposited by flies; in October and November, these worms become flies, which pierce the second figs called *cratirites*, which do not appear till the end of September: these figs continue to the month of May following, and furnish a lodgment for the eggs of the second class of flies. In May, the third species of figs, called *orni*, appear; and when they are grown to a certain size and begin to open at the eye, they are pierced by the flies produced by the *cratirites*, or winter figs. When the worms bred in these spring figs are transformed into flies, which happens in the months of

May or July, the peasants gather them, and transport them to the garden fig-trees. The success of the caprification depends on this circumstance, and therefore they visit their wild fig-trees and their garden fig-trees every morning, to examine the eye of the fig; by which they judge when the flies are about to issue from the wild figs, and when they may be applied so as to pierce the garden figs. They are then deposited on such trees as are fit to receive them, and enter the fruit by the eye, where they lay eggs, the worms of which cause the garden figs to attain their proper degree of bigness and maturity. The consequence of this operation is, that garden fig-trees, which would scarcely yield twenty-five pounds of ripe figs, and fit for drying, yield two hundred and eighty pounds.

As to the manner whereby the puncture of the flies contributes to the maturation of the fruit, possibly it may be by lacerating the vessels, and extravasating the nutritious juice when they deposit their eggs; with the egg they may also convey some liquor which gently ferments with the juice of the fig, and softens its pulp. Even the Provence and Paris figs ripen much sooner by wounding their buds with a straw or feather dipped in oil-olive; plums and pears also wounded by insects are found to ripen the soonest, and in these the pulp about the wound is more exquisite than the rest. Mem. Acad. Scienc. ann. 1705, p. 447, seq.

Olivier, in "Nouveau Dictionnaire d'Histoire Naturelle," speaks of this practice as merely the effect of a vulgar error sanctioned by its high antiquity, and asserts that, after a long residence in the islands of the Archipelago, he is convinced of its futility. Caprification, he observes, is unknown in many countries of the East, has not been adopted in France, Italy, or Spain, and has lately been discontinued in several islands of the Archipelago, where it was formerly in use, and yet, nevertheless, good figs are produced in all these countries. The assistance of the Cynips, or fig-fly, he alleges, cannot be necessary to render the young germs fertile, since each fig contains near its eye a sufficient number of male flowers to impregnate all the female ones within its cavity; and that if it were necessary, the pollen of the wild fig tree, which is supposed to be conveyed by the fly to the germs of the cultivated kind, could not fecundate, at the same time, those which have attained to a considerable size, and those which have but just, or have not yet appeared, and which do not ripen till two months afterwards. In answer to the latter part of the objection, it may, however, be remarked, that Tournefort particularly mentions the strict attention paid by the Greek peasants to the exact time when the orni of the wild should be placed upon the garden fig-tree, and that every part of the crop must be supposed to have the needful supply at its proper season. We may also add, that the reasoning employed by Olivier does not at all apply to Tournefort's conjecture concerning the proximate cause of the effect produced. The proper question to be considered is not whether the fig can produce fertile seed without the aid of the fly; of that no well-informed naturalist will entertain a doubt; but whether the fruit of the cultivated tree is increased in size, and heightened in flavour, by the operation. But still it may be asked, why does not the puncture made by the fly occasion a similar extravasation of the nutritious juice of the wild fig, or convey to it the same fermenting liquor, and thus improve its native qualities? The subject, it must be acknowledged, is attended with difficulties which have not yet received a satisfactory solution. But it surely is an unwarrantable degree of scepticism, on account of these, to discredit the relations of able observers, founded on the experience of ages. Olivier refers to some interesting and instructive

instructive memoirs published by Bernard on this subject, which we have not at present an opportunity to consult.

CAPRIFICATION is also applied, in a less proper sense, to the art of propagating the palm-tree. *Act. Erudit. Lips.* 1721, p. 84.

CAPRIFICUS, in *Botany*, the name of the wild fig-tree.

CAPRIFOLIA, the third order of the eleventh class of Jussieu's natural system. It has the following characters: *Calyx* one-leaved, superior, often calyced, or bracteated at its base. *Corolla* generally monopetalous, either regular, or irregular; in a few instances polypetalous, petals united by a broad base. *Stamens* of a definite number, often five; in the monopetalous genera always inserted into the corolla, and alternating with its segments; in the polypetalous ones sometimes placed upon the pistil, alternating with the petals, and sometimes fixed to the middle of each petal. *Germ* inferior; style generally single, sometimes none; stigma single, or rarely three. *Fruit* inferior, either a berry, or a one or many-celled capsule; each cell with one or many seeds. *Coraculum* of the seed in a large upper cavity of the large, solid perisperm. *Stem* either a shrub or a tree; rarely herbaceous. *Leaves* in most, opposite; in a few, alternate; stipules none.

It is divided into four sections: 1. *Calyx* calyced, or bracteated; style single; corolla monopetalous. *Linnaea*, *triosteum*, *ovieda*, *symphoricarpos*, *diervilla*, *xylosteum*, and *caprifolium*. 2. *Calyx* calyced or bracteated; style single; corolla subpolypetalous. *Loranthus*, *viscum*, *rhizophora*. 3. *Calyx* bracteated; style none; stigmas three; corolla monopetalous. *Viburnum*, *hortensia*, *sambucus*. 4. *Calyx* simple; style single; corolla polypetalous. *Cornus*, *hedera*.

CAPRIFOLIACEÆ, the third order of the eleventh class of Ventenat's natural system, with the same characters, divisions, and genera, as the Caprifolia of Jussieu, except that *Ovieda* and *Hortensia* are omitted. The plants of this family are generally reckoned astringent.

CAPRIFOLIUM, a name given by the old botanists to several plants which Linnæus afterwards placed in his genus *Lonicera*. Tournefort confined the term to such species as have their flowers in heads, with an irregular two-lipped corolla. Jussieu and Ventenat extend it to all that have flowers in heads, or in axillary, six-flowered whorls, including those with a corolla nearly regular, the *Periclymena* of Tournefort. Gærtner seems to have comprehended under his *Caprifolium*, the whole Linnæan genus *Lonicera*, having restored the latter name to the *Loranthus* of Linnæus, some of whose species had been called *Lonicera* by Plumier and others. The name, it may be allowed, was changed by Linnæus without sufficient reason; but Gærtner has in fact only increased the confusion, in attempting to remove it.

CAPRIGLIA, in *Geography*, a town of Naples, in the province of Principato Ultra, 13 miles S. of Benevento.

CAPRIMA, in *Ancient Geography*, a small town of Asia Minor, placed by Diodorus Siculus in Caria.

CAPRIMULGUS, in *Ornithology*, a genus of the order PASSERES, the *goatsucker* of the English, and *l'engoulevent* of French authors. The character of the genus consists in having the bill slightly curved, very small, subulate, and depressed at the base; mouth extremely large, and fringed at the sides with a series of bristles; ears ample; tongue short and very entire; tail not forked, and containing ten feathers; legs short; middle claw with a broad ferrated edge. Thus far we follow Gmelin, but we have to observe, that, although this definition of the *Caprimulgus* genus is applicable to most of the species, there are some with which it will not agree. In *Caprimulgus grandis* and *jamaicensis*, for example, the

claw of the middle toe is not ferrated, and it is suspected there are other species described, on the testimony of foreign authors, that are destitute of this Gmelinian character. Gmelin coincides with Latham in considering the entire figure of the tail as an essential character of the genus, but there are species known that have the tail furcated, and others that contain twelve feathers in the tail instead of ten, which latter is considered by both those writers as an essential criterion, amongst others, of the *Caprimulgus* genus. The species described are 21 in number.

CAPRIMULGUS *grandis*, the *grand goatsucker* of Latham. *Ibijau*, *Caprimulgus americanus*, Ray. *Le grand ibijau*, and *Grapaud volant de Cayenne* of Buffon. This is specifically distinguished by being of a blackish colour, variegated with white and yellow; beneath white and black varied; area of the eyes yellowish; legs white. *Lath. Ind. Orn.* Blackish, varied with minute brown spots and streaks; middle claw not ferrated. Gmelin.

This gigantic species of goatsucker was supposed to be the largest of its race till the recent discovery of *Caprimulgus megacephalis* in the Australasian regions, and was therefore named specifically *grandis*. It is nearly the size of a small buzzard, measuring $23\frac{1}{2}$ inches in length. The bill, which is three inches long, is covered nearly to the tip with hairs, that completely conceal the nostrils. The plumage is blackish, varied principally with whitish and cream-coloured spots and marks on the upper parts of the body. The wings are brown on the outer edge; scapular feathers chiefly white; quills deep brown, slightly barred with white on each side, and the shafts black. The wings reach almost to the end of the tail, which last is 11 inches in length, rounded at the extremity, and of a brown colour, with seven or eight narrow dotted bars of white. Its legs are brown, and covered nearly to the toes with feathers; middle claw not ferrated. Inhabits Cayenne, where it is said to secrete itself within the hollow of some decayed tree in the day-time, especially such as stand near the water. Willughby's figure of the great ibijau is copied from one given by Marcgrave, that is not very remarkable for its accuracy, both a *crest* and *horn* being erroneously represented on its head. There is a specimen of this bird in the Leverian museum.

CAPRIMULGUS *megacephalis* of Latham, *Pengoulevent mégacéphale* of Vieillot. A species superior in size to *Caprimulgus grandis*, lately discovered in New South Wales. The length of this bird is 28 inches. General plumage blackish brown, variegated and streaked with yellowish and dull white; breast dirty-ferruginous; belly pale-ash; wings and tail spotted, and banded alternately with black and whitish. The head and neck appear of a large size from the abundance of feathers with which those parts are covered. The bill remarkably stronger than any other of the goatsucker tribe, its colour pale brown, and fringed at the base with a series of feathers, much longer than the rest, that stand nearly erect, and form a kind of crest. The legs are yellowish.

CAPRIMULGUS *jamaicensis*, the *Jamaica goatsucker*. The plumage of this species is ferruginous, streaked with black; wings variegated with white; quill-feathers brown, with white spots; tail barred with black. *Lath. Ind. Orn.* *Caprimulgus Jamaicensis*, Gmel. *Guira querea*, Ray, Buffon, &c. and *Mountain owl* of Brown.

This kind, though inferior in size to the former species of goatsucker, is a large bird, being about a foot and a half in length. Sloane describes it in his history of Jamaica, but mistakes it for a kind of wood owl, and Brown has fallen into a similar error. The bill is of a black colour, and much bent downwards at the tip, corresponding in this particular with

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the lower mandible, which is also bent in the same direction, and close exactly together when the mouth is shut; the nostrils are covered with feathers. The irides are reddish-yellow, and the eyes are surrounded with a disk of feathers not unlike those of the owl tribe, and which appear to have deceived both Sloane and Brown. The upper parts of the head, neck, and body are composed of a mixture of ferruginous and black, streaked longitudinally; the wing-coverts are partly brown, of a deep cast, and partly ferruginous and fuscous varied, and irregularly dotted with blackish, and some of the inner ones with a mixture of white. The quills are of a deep black brown, marked on the outer edge with eight or nine white spots. Its tail is seven inches long, cinereous, dotted with black, and crossed with seven or eight bars of black brown. The legs rather large, feathered to the toes, and armed with black claws, the middle one of which, as in the former bird, is not ferrated. This species, as its name implies, is a native of Jamaica, where it is reported to be uncommon; it inhabits woods, and feeds principally on insects.

CAPRIMULGUS griseus, grey goatsucker. General colour grey; wings black, with pale grey lines; tail brownish grey with fuscous lines. Gmel.

A species thirteen inches in length, that inhabits Cayenne: the bill is of a brown colour above and yellow beneath; tail five inches in length, and scarcely extending beyond the length of the wings when the bird is at rest. Buffon, who describes this species, calls it *Pengoulevant gris*.

CAPRIMULGUS carolinensis, Carolina goatsucker of Catelby, a kind distinguished by having the upper part of the plumage waved with grey and blackish; beneath reddish-grey, with small blackish lines; three exterior tail-feathers white on the inner edge. Ind. Orn. "Supra lineis transversis angulatis alternis atris et griseis variis, subtus ex rufo griseus lineis nigricantibus longitudinalibus, cauda griseo atro cancellata." Gmel. We have adopted Dr. Latham's specific character of this bird, in preference to that of Gmelin, as being most expressive. The species inhabits Virginia and Carolina, and, like the rest of the goatsuckers, appears only on the wing in the evening, or when the sky is obscured with heavy clouds preceding rain. The North Americans, it appears from Brown and other writers, call it the rain-bird, in allusion to the latter circumstance. It is the short-winged goatsucker of the Arctic Zoology.

This does not exceed the common European goatsucker in point of size. The bill is dusky; upper parts of the head, neck, and body transversely variegated with zig-zag alternate lines of dusky-brown and grey; the crown has also some spots of the latter colour, and on the wings are both spots and longitudinal yellowish and dusky streaks. The sides of the head, and all the under parts, are rufous-grey, marked with longitudinal blackish lines; from the gape of the mouth along the jaw on each side is a white streak; and beneath this are a few yellowish spots; quills barred with dusky and grey, and spotted on the outer webs with yellow; on the inner web of the three first is a large white spot. The tail is four inches long, of a grey colour, with dusky bands and lines; legs brown, claws black, the middle one ferrated. This bird is said to lay its eggs on the ground, and it appears they very much resemble those of the lapwing.

CAPRIMULGUS Guianensis, the Guiana goatsucker. Colour tawny, streaked and spotted with rufous; beneath the throat a white lunar band. *Le montvoyau de la Guiane*, et *Tette-chevre roux de la Guiane* of Buffon.

This kind, which inhabits Guiana, is nine inches in length. The bill is about three quarters of an inch in length, and is beset with bristles. The general colour of the plumage ful-

vous, with an irregular mixture of rufous throughout; on the top of the head, and hind part of the neck the streaks are longitudinal, but on the upper part of the back oblique, as well as mixed with spots of an irregular shape on the rest of the upper parts. Beneath, the plumage much resembles that above, but the spots or markings are mostly placed in a transverse direction. From the gape arises a white band, which passes along the jaw and under the throat. The quill-feathers are black, the first five or six marked with a white spot. Tail three inches long, and extending an inch beyond the wings when they are closed. This bird, we are informed, is frequently observed to repeat the three syllables *moit-voy-au* very distinctly, when flying abroad at twilight in search of prey.

CAPRIMULGUS rufus, the rufous goatsucker, *Pengoulevant roux de Cayenne* of Buffon, and *Crapaud volant, ou Tette chevre de Cayenne*, Pl. Enl. The species is distinguished by being of a rufous colour, varied with black in longitudinal streaks; wings, and lower part of the body fasciated with blackish; quill-feathers varied with rufous and black, in alternate stripes.

Somewhat larger than the foregoing species, being ten inches and a half in length. It inhabits Cayenne. The bill is of a pale brown colour; the irides yellow; and the plumage varied as before observed, with rufous, black, and a few white spots. The throat is marked transversely with lines; the lower part of the body is also lineated, but the lines increase in breadth as they pass backwards, the upper part of the belly is blackish, the lower rufous. The tail is banded with black, and exceeds the wings by half an inch. The legs are flesh colour.

CAPRIMULGUS Europæus, the European goatsucker. The colour black, varied with cinereous, fuscous, ferruginous, and white; beneath reddish-white, with fuscous bands. "Niger, cinereo, fusco, ferrugineo et alba variis, naribus obsoletis." Linn. Fn. Suec. *Nocturnal goatsucker*, Pennant.

The European goatsucker, as it is generally called, is a native of Asia and Africa, as well as Europe. Its length is ten inches and a half. The plumage is of a deep blackish colour, beautifully speckled and diversified with spots of grey, ferruginous, and white. The tail is four inches long; the legs short, rough, or scaly, and feathered much below the knee; the toes connected together on each side by a slight membrane, and the middle claw ferrated. The plumage of the male is brighter than in the female, and it is besides known by having an oval white spot on the inner webs of the three exterior quill feathers, and another at the tip of the outer feathers of the tail.

A variety of this species is reported to have been brought from China by Sonnerat. This was rather larger, and the colours somewhat darker, than in our common kind; the feathers of the wings were black, marked with yellow spots, each enclosing a black dot in the centre, and the whole were so disposed, that, at the first glance, the wings appeared to be marked transversely with seven alternate bands of yellow, and the like number of black ones.

Fern-owl, churn-hawk, dorr-hawk, and night-jarr are the most familiar provincial names of this common goatsucker in various parts of England. Latham calls it the European goatsucker, this being the only bird of its genus that is found in Europe. It commonly arrives in England the latter end of May, and remains in the southern parts of the island till about the end of September. In its passage from the eastward, it visits Malta, and the south of Europe, a month sooner than England; and it is seldom earlier than October that it quits France; they have been seen in that country till November.

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November. Some French authors assure us, that several birds of this species have been shot in the woods of Vosges in the middle of winter, but such occurrences are very rare. The species has been recently observed in Siberia and Kamtschatka, where it lives not only in forests but also in open countries, where it finds rocks, or high banks, for shelter. With us it lives in woods, and feeds on insects, which it collects on the wing, in the dusk of the evening and morning, like the owl, and remains secreted, like that nocturnal bird, in the hollow of a tree, or some dark recess, during the day-time. By chance, however, it has been noticed on the wing in the day-time when disturbed in very gloomy weather. It is a great destroyer of the cockchafer-beetle, many of which, with other insects, are usually discovered in its stomach on dissection. The note of this bird is singular, resembling the noise of a large spinning-wheel, or as some liken it to that of the letter R frequently repeated, and which it is said to emit only when perched on the branch of a tree, with its head hanging down in the dusk of the evening. Besides this, it has a sharp squeak, which is supposed to be its call of love, as the male is observed to utter it when in pursuit of the female. Its manner of perching is curious, for it almost constantly places itself longitudinally upon the branch, instead of across, like other birds. The goatsucker was accused by the ancients, and many of the elder writers, of sucking the teats of goats, and it is from this vulgar prejudice its popular name of goatsucker is derived; this absurd notion, though countenanced by Buffon, is justly exploded by all modern authors. The female makes no nest, but lays her eggs upon the bare ground, or loose crags, without any apparent care; they are usually two in number, of a white colour, and blotched with bluish brown.

CAPRIMULGUS Virginianus, Virginian goatsucker. Colour brown, varied with grey and reddish; beneath reddish-white, transversely streaked; chin with a triangular white spot; area of the eyes and neck above spotted with orange.

This is smaller than the European goatsucker, its usual length being eight inches, but should the *mosquito-hawk* of Hudson's bay, described on the authority of Mr. Hutchins by Latham, in his Supplement, prove to be the same bird as is generally suspected, it sometimes attains to the length of nine inches and a half. All the upper parts of the body are of a dull brown, transversely variegated and blended with rufous brown, and an intermixture of ash-colour, with a slight proportion of grey on the wings; on the chin is a white triangular spot, mottled with orange at the under part. The quills are dusky, the first five marked with a white spot about the middle; tail marked similar, the two outer feathers with a spot of white near the extremity; legs flesh-colour, middle claw serrated.

During the summer, this bird inhabits Virginia, where it first arrives about the middle of April, and frequents the mountainous parts, but will frequently approach the houses in the evening, when it commonly settles on a rail or post, and cries for several times together very loud, somewhat like the word *whip-poor-will*, or *whip-poor-will*, pronouncing the first and last syllables loudest. The noise of this bird, which is both loud and disagreeable, continues oftentimes the whole night, and it not unfrequently happens that four or five birds of the same species keep in company, and cry in concert together. They subsist chiefly on insects. The eggs are of a greenish colour, with dusky spots and streaks. Kalm speaks of the flesh of this bird as an article of food.

Linnaeus appears to have considered this as a variety of the common or European goatsucker, *Caprimulgus Europaeus* β . Both Catesby and Buffon call it *whip-poor-will*, in allusion to

its note; it is the long-winged goatsucker of the Arctic Zoology, and Virginia goatsucker of Latham.

CAPRIMULGUS vittatus, striped goatsucker, and *Pengoulevant a bandes noires* of Vieillot. A new species recently discovered in New Holland, where the English settlers call it the mosquito hawk. This bird is about nine or ten inches in length; the upper part of the head and neck are black, with a stripe of the same colour passing, in the form of a crescent, behind the eyes. The black stripe on the upper part of the neck descends on each side to about the middle, where it divides into two distinct branches. Those parts of the head where the black does not appear is of a pale carnation or flesh colour. The upper portion of the neck, with the body beneath, are of a somewhat similar colour, but more inclining to ferruginous. Under the eyes, sides of the neck, and upper part of the wings are marked with spots and vermicular lines; back and wing-coverts obscure blue, speckled with black; quills blackish, spotted and edged with rust-colour; tail-feathers dark brown spotted with ferruginous, and slightly forked; bill large, and of a black colour; legs reddish flesh colour.

CAPRIMULGUS albicollis, white-throated goatsucker of Latham. The plumage is rufous brown, varied with white and blackish streaks; beneath brownish with black lines; a triangular white spot on the throat; tail somewhat emarginated.

Length ten inches and a quarter; bill brown with the tip black, and the nostrils rather prominent; head streaked with black, upper parts of the body the same, but more obscure; the scapulars, and most of the outer wing coverts have a black band near the end, and the tips yellowish buff-colour; lesser quills spotted with rufous cream-colour on the outer web, the greater dusky black, and crossed about the middle with a white bar; tail somewhat wedge-formed, the third feather white, second white within and black without, the outermost with a white spot near the base; legs brown; middle toe very long, and greatly serrated. Described by Dr. Latham, from a specimen in the collection of general Davies, that is supposed to have come from Cayenne.

CAPRIMULGUS semitorquatus, white-collared goatsucker of Latham, is described on the authority of Buffon, who calls it *le petit engoulevent de Cayenne*; Gmelin calls it *semitorquatus*. This bird is blackish, varied with rufous and grey, with a white lunule on the lower part of the collar. Length eight inches, and inhabits Cayenne.

CAPRIMULGUS Brasiliensis, Brazilian goatsucker. Plumage yellowish black, varied with white specks; beneath varied with black and white; area of the eye yellowish white.

Size of a swallow. Bill and eyes blackish; wings and tail even; legs white, the middle claw serrated at the outer edge; tail expansive. This, as the name implies, inhabits Brazil.

CAPRIMULGUS acutus, sharp-tailed goatsucker, and *Pengoulevant acutipenne de la Guyane* of Buffon.

This kind is readily distinguished by the pointed tips of the tail-feathers from the rest of the species in the same tribe; the plumage is blackish, fasciated above with grey, and beneath with rufous; head and collar reddish brown. It inhabits Guiana, and is about seven inches and a half in length. The shafts of all the tail-feathers are bare of webs at the tips; bill and legs black.

CAPRIMULGUS Cayennensis, Cayenne, or white-necked goatsucker. Plumage rufous and grey, varied with black undulated lines; throat and stripe on the wing white; temples rufous, with five black streaks. *Caprimulgus cayanus*, Latham.

Described

Described on the authority of Buffon, who calls it *Pengoulevant de Cayenne*, as being seven inches and a half in length. Bill black, irides yellow; head and neck tinged with rufous; lower part of the belly spotted with black; two middle feathers of the tail grey, crossed with five or six blackish bands; the rest black, bordered with white; legs yellow brown. This bird inhabits Cayenne, where it is found in the plantations, and when on the wing is said to utter a weak cry, which has been compared to that of the toad, and it has also another note that somewhat resembles the barking of a dog. It is not a timorous bird by any means, neither is it a rare species.

CAPRIMULGUS Americanus, *American goatsucker*, distinguished specifically, according to Gmelin, by having the nostrils very prominent and cylindrical. The plumage is variegated with black, grey, and obscure brown.

This is a Linnæan species, *Caprimulgus Americanus* of that naturalist. Ray calls it the small wood-owl, as does likewise Sloane, in his History of Jamaica; it is *Pengoulevant à lunettes*, *ou le haleur* of Buffon, and other French authors. This bird is seven inches in length; the bill black, and beset with bristles; the nostrils projecting about one-eighth of an inch; legs and claws grey. Like the rest of its tribe, this kind feeds on insects. It is found in various parts of America.

CAPRIMULGUS Nova Hollandie, *crested goatsucker* of Phillips' Voyage to Botany bay. This is of a brown colour, clouded with black and whitish, and whitish beneath; neck and breast with dusky bands; crest on the front erect and setaceous.

Inhabits New Holland, and is rather smaller than the European goatsucker. The length is nine inches and a half. Its bill is black; gape wide, and yellowish within; behind the base of the upper mandible arises a crest of twelve bristles, which are thinly bearded at the sides; quill-feathers brown, the five or six exterior ones with whitish spots on the outer side; tail rounded, fuscous, with twelve whitish bands clouded with blackish; legs rather long and yellow.

CAPRIMULGUS Asiaticus, *Asiatic goatsucker*, or *Bombay goatsucker* of Latham. Plumage pale-ash, clouded with black and ferruginous; breast banded with cinereous; crown with a blackish streak, and a pale spot on the jaws and chin.

This species was first described by Dr. Latham, from a specimen in the possession of Sir Joseph Banks, in the Supplement to his Synopsis of Birds. It is, he says, the size of the Virginia goatsucker: length eight inches and a half. Bill dusky; general colour of the plumage not unlike that of the Siberian owl, being a beautiful mixture of pale ash colour, mottled with dusky down the middle of the crown; on each side of the under jaw is a pale streak; and on the throat a whitish spot; the breast crossed with numerous cinereous bars; between the legs pale rufous; the quills are dusky, barred with rufous; the first shortest; four of the greater quills have a spot of white on the inner web; the tail marked the same, but the two middle tail-feathers are likewise mottled, as the back; the two outer ones on each side have the ends white for about an inch, but the white extends higher up on the outer webs; the middle toe is greatly pectinated. Inhabits Bombay. Lath. Suppl.

It seems this bird has been also discovered in Africa by Le Vaillant, who names it *Pengoulevant musicien*, in compliment to its note, which he observes is both piercing and melodious, contrary to what has been advanced by an English writer (Dr. Latham), who affirms that its noise is horrible. It has the same manners of life as the European goatsucker.

CAPRIMULGUS Indicus, *Indian goatsucker*. Colour pale

ash, transversely lineated with black; cheeks, breast, and wings spotted with ferruginous; tail-feathers bluish, fasciated with black, the exterior one varied with ferruginous and black.

Latham describes this species, in his Supplement of Birds, as a native of India, on the authority of Lady Impey, without mentioning its size. Another account is given of it by Viellot, a French naturalist, under the name of *Pengoulevant cendré, rayé de noir*, but which is a literal French translation of the following description. "Crown and back whitish ash-colour, elegantly marked with minute dusky lines; cheeks, breast, wing-coverts, and secondaries beautifully marked in the same manner with lines and large spots of rust; prime quills dusky; middle feathers of the tail light ash, crossed with a few black bars; outermost feathers rusty and black."

CAPRIMULGUS torquatus, *gold-collared goatsucker*. This is an inhabitant of Brasil, and is about the size of the common lark. The plumage is cinereous-brown, varied with whitish and dull yellowish spots; on the hind head a golden ring; two middle tail-feathers longest.

Though the body of this bird is scarcely larger than a lark, its length of wings and tail is considerable. The upper mandible of the bill is hooked, and beset at the base with ten or twelve thick bristles; eyes black, head large, flat, and broad. The two middle tail-feathers are eight inches in length, but the rest are shorter; legs dusky, with black claws, the middle one of which is ferrated. This is called by Brisson *Tette-chevre du Bresil*; and *Le petit engoulevant tacheté de Cayenne* by Viellot.

CAPRIMULGUS longipennis, *Leona goatsucker* of Shaw, Nat. Misc. A native of Sierra Leona. Size of a starling. The plumage is grey, variegated; wings spotted with rufous and black; on each shoulder a long naked-shafted feather.

Viellot describes this curious bird under the title of *Pengoulevant de Léone*, after Dr. Latham, who very lately published an account of it, in which he names it *Caprimulgus macrodipterus*. The French author, Viellot, gives it as a new species, on the authority of Latham; from which we may presume he was either not aware of its having been previously described by Dr. Shaw, as above mentioned, or did not think proper to acknowledge the circumstance.

CAPRIOLES, derived from *capreolus*, a diminutive of *capra*, goat, in *Horsemanship*, are leaps which a horse makes in one and the same place, without advancing forwards; and that in such manner that when he is in the air, at the height of his leap, he yerks or strikes out with his hind-legs as near and even together, and as far out as he can stretch them; in which action, he clacks, or makes a noise with them.

The capriole is the most violent of all the high-raised airs: there are several kinds of caprioles; as a *right capriole*, *back capriole*, *side capriole*, *broken capriole*, the *open capriole*, &c.

To make this air perfect, the horse should raise his fore parts and his hinder to an equal height; and when he strikes out behind, his croupe should be on a level with his withers. In rising, and in coming down, his head and mouth should be quite steady and firm; and he should present his fore-head quite straight: when he rises, his fore-legs should be bent under him a good deal, and equally. When he strikes out with his hinder legs, he ought to do it nervously, and with all his force; and his two feet should be even, of an equal height, and their action the same: lastly, the horse should, at every leap, fall a foot and a half, or the space of two feet distant from the spot from which he rose. In order to make caprioles, it is not absolutely necessary that a horse should pass through *curvets* and *balotades*; because some horses are naturally

rally more light and active in their loins than strong, and which are brought to leap with more difficulty, than to the other airs in which their strength must be much more united, and their disposition attended to; but nevertheless it is certain, that if the horse is brought to rise by degrees, and is worked in the intermediate airs, before he undertakes the caprioles, he will not weaken and strain himself so much, and will be sooner confirmed in his lessons, than one which begins at once with the caprioles. The motions of a horse, when he makes a perfect capriole, have an effect directly opposite to that of pesades and curvets. These two airs are proper to assure the head of the horse, and to make it light, and this by so much the more as the principal action depends upon the haunches, and a moderate appuy of the mouth; but caprioles are apt to give too great an appuy, because the horse, when he makes the strongest action of his air, that is, when he strikes out as he is coming to the ground, is entirely supported by the hand; therefore, before he is put to leap, he ought to have a perfect appuy, and his shoulders should at least be suppled and lightened, by having made pesades; and he should be without fear, anger, or any kind of uneasiness, because, by leaping, he acquires a knowledge of his own strength and power, and he may apply it to bad purposes, to free himself from obedience, and to indulge his caprice and ill humour. Some horses have a disposition to this air, and sufficient strength to go through it; but their mouths are so delicate, sensible, and averse from the hand, that you cannot support them without hindering them from advancing: hence it follows, that their action before is cold and slow, and never sufficiently high, and they cannot be carried forward when they raise their croupe, and strike out; and it is impossible to keep them firm as they come down. To remedy this, begin their lesson upon the trot, and press them in it so smartly, as to make them often go into the gallop; observe a medium, in order to save their strength and vigour, that they may furnish as many leaps as are requisite to the perfection of the air. Pursue the same course with a horse that is too strong, and who retains and avails himself of the strength of his back, so as not to make his leaps freely and readily; by this means you will abate his superfluous vigour, which serves only to disunite and make him troublesome. It is usual to supple a horse that is light in the hand by means of the trot, before you teach him to leap; but a contrary method must be observed with those which are heavy and clumsy, or that pull upon the hand. Gallop and trot them; and this exercise will take away all fear of the aids and corrections, and the following day they will present themselves more freely and willingly. Instead of trying to correct the horse, which pulls upon the hand, compel him to make some caprioles with his face to the wall, and keep him up to it closer, or farther off, as you find him heavy, or endeavouring to force the hand; and by this method you will constrain him to shorten his leaps, and to be more attentive to his business. If he abandons himself, or bears too hard upon the hand, hold him firm at the end of his leap, and in the instant when his feet are coming to the ground, yield your hand immediately to him, and he will abandon himself much less upon the bit. If he retains himself, and hangs back, easing your hand to him will not alone be sufficient; but to make him advance, you must push him to his bit, by aiding him briskly, and in time, with your legs.

To dress a horse to the caprioles, the pillars may be employed, or they may be dispensed with. When the pillars are used, tie him to them, make him keep up to his bit properly, or what is called "fill up the cords," and endeavour, by little and little, to make him rise before, taking care to

make him bend his knees, and gather up his legs, as much as you possibly can. For this purpose, use your switch briskly; for if you can teach him to bend his legs well, his manege will be much more beautiful, and he will be much lighter in the hand. When the fore-part has been thus gained, put him in the pillars again; shortening the cords, in order to make him raise his croupe from the ground, and jerk out equally, and, at the same time, with both his hinder legs, which he must be taught to do, by attacking and striking him upon the croupe with the switch or chambriere. When he is able to rise before and lash out behind, let him be taught to unite these two times, and perform them together. Let him then be mounted, and always in the pillars; and let the rider support him in the hand, and put him to make one or two leaps, without leaning upon the cords of the cavefon, in order that he may learn to take a just appuy, and to feel it. As soon as he begins to know and obey the hand, he should be aided gently with the calves of the legs, should be supported, and you should "pinch" him delicately and finely with both spurs. If he answers once or twice to these aids, without losing his temper, or being angry, you will have great reason to expect that he will soon furnish his leaps equally and justly, with respect to the hand and heel. When he has been so far advanced by means of the pillars, walk him strait forward a certain space; and if he does not offer to rise of himself, try to make him. If he himself takes the right time, seize the moment, avail yourself of it, and let him make two, three, or four caprioles, or one or two, as you may judge it necessary. By letting him thus walk calmly and quietly, in a short time he will, of himself, begin to make caprioles strait forward; but in case he should discover any signs of resistance to the hand or heel, or the other aids, recourse should be had immediately to the cavefon and pillars. The method, now described, of adjusting and dressing a horse for caprioles, by means of the pillars, is very dangerous in itself, and capable of spoiling and making a horse become desperate and ungovernable, unless it be practised by persons of consummate skill and experience.

Mr. Berenger prefers the following method, which, though more difficult and painful to the horse, is better and more sure. Having well exercised the horse in "pesades," walk him strait forward, keeping him "together," and supporting him so as to hold and keep him in the hand, but not so as to stop him entirely. After this, strike him gently with the end of the switch upon his croupe and buttocks, and continue to do it till he lifts up his croupe and kicks. Then caress him, and let him walk some steps, and then attack him again, not minding to make him rise before, nor hindering him from it, if he offers so to do. Remember to encourage and coax him every time that he answers to the aids, and obeys. When he is thus acquainted with the aid of the switch, let him make pesades of a moderate height, strait forward, and at the second or third, attack him behind with your switch, to make him lash out. If he obeys, make him rise "before" again in the minute that his hinder legs come to the ground, in order to make him furnish two or three pesades, to work his haunches. After this, coax and caress him without letting him stir from the place, if his appuy be firm and good; and in case it is hard, make him go backwards, or if it is light and just, let him advance quietly and slowly. To enable him to make his leaps just, and to know the exact time of making them, no attention should be given to the number of pesades he makes before or after his leap, but at the moment when you feel him prepared, and whilst he is in the pesade, aid him briskly behind; letting him, in the beginning, not rise so high "before,"

when

when you intend he should jerk out behind, as he would, were he only to make a pefade, that fo his croupe may be more at liberty, and he may jerk out with greater eafe. In proportion as his croupe becomes light and active, you may raife his fore-part higher and higher, and fupport it while in the air, till he makes his leaps true, and in juft proportion. When thefe leffons have been fufficiently praftifed, you may retrench by degrees the number of the pefades, which feperated and divided the leaps. You may now demand of him two leaps together; and from thefe you may come, with patience and difcretion, to three, or from three to four leaps; and, laftly, to as many as he can furnifh in the fame air and with equal ftrength. Remember always to make him finifh upon his haunches; and this is the only fure way of preventing all the diforders a horfe may be guilty of from impatience and fear. Some horfes will leap very high, and with great agility ftrait forwards, which, when put to leap upon the voltes, ufually lofe their natural grace and beauty, for want of ftrength and not being equal to the lafh, in which all their motions are forced and contrained. If a horfe has a firm appuy and ftrength fufficient to furnifh this air upon the voltes, begin by making him know the fpace and roundnefs of the volte to each hand; let him walk round it in a flow and diftinct pace, keeping his croupe very much preffed and confined upon the line of the volte, which ought to be much larger for this air than for "croupades" and "balotades." When this is done, make him rife, and let him make one or two caprioles, followed by as many pefades; then walk him two or three fteps upon the fame line; then raife him again, fupporting him more and more, and keeping him even upon the line of the volte, fo that it may be exactly round, and confining his croupe with your outward leg. If this leffon be given with judgment, your horfe will foon make all the "voltes" in the fame air; and to make him furnifh a fecond, as foon as he has clofed and finifhed the firft, raife him again, and without letting him ftop, get from him as many leaps as you can, working him always upon the volte, in which he walks and leaps alternately, till he clofes and ends it with the fame vigour and refolution as he did the firft. Aid always with the outward rein, either upon the voltes, or when you leap ftrait forward, you will narrow and confine the fore-parts, and enlarge the hinder parts, by which means the croupe will not be preffed, but free and unconstrained. See CURVETS and VOLTES. The fureft way to fucceed, when you undertake to drefs a horfe to caprioles, is to arm yourfelf with an invincible patience, and to prefer for this purpofe fuch horfes as have a difpofition, are active, light, and have a clean finewy ftrength, to fuch as are endowed with greater ftrength and force; for thefe laft never leap regularly, and are fit for nothing but to break their riders' backs, and make them fpit blood, by their irregular, violent, and unexpected motions. Berenger's Hift. and Art of Horfemanfhip, vol. ii. ch. 20.

CAPRISCUS, in *Ichthyology*, a fpecies of **BALISTES**, that inhabits the Indian, Mediterranean, and American feas. It is fpecifically diftinguifhed by having the dorsal ray ferrated in front; ventral fingle and low; tail rounded; finout fomewhat obtufe. Gronov.

This is caprifcus of Artedi and others, caper of Renard, and poupou-noble of Renard. It is an interefting fpecies, and has the body variegated with many colours.

CAPRISCUS, is alfo the name given by Klein to **BALISTES MONOCEROS**, which fee.

CAPRONE, in *Geography*, one of the Greek iflands N.W. of Stanchio, larger than Capra, and near it. See **CAPRA**.

CAPRONEZA, a fmall town of Hungary, in Sclavonia; 12 miles from the Save.

CAPROTINA, in *Mythology*, a name given to Juno by the Romans, in commemoration of a fingular event recorded in the Saturnalia of Macrobius, l. i. c. 12. After the Gauls had quitted Rome, the neighbouring people took the advantage of their departure, and of the exhausted ftate of the republic, and befieged the city under the conduct of Lucius, dictator of the Fidenates. They demanded of the Romans the furrender of their wives and daughters. The flaves, in conformity to the counfel of one of them, named Philotis, affumed the habits of their miftreffes, and prefented themfelves to the enemy; who, conceiving them to be the Roman females whom they had demanded, diftributed them through their camp. Under the pretence of celebrating a feaft, they induced the officers and foldiers to drink freely; and when they were all afleep they gave a fignal to the city by means of a wild fig, called in Latin "caprificus." The Romans rufhed fuddenly upon their enemies, filled their camp with carnage, and gave liberty to their flaves, together with a fum of money at their marriage. They inftituted alfo a feaft to Juno, who in reference to the wild fig, was furnamed "Caprotina." The day on which Rome was thus delivered, and which was the nones of July, was called the "Caprotine" nones. This fingular victory is mentioned by Plutarch and Arnobius.

CAPROTINIA, feafts of Juno Caprotina, which were celebrated on the 9th of July, in favour of the female flaves. During this folemnity they ran about beating themfelves with their fits and with rods. None but women affifted in the facrifices offered at this feaft.

CAPRUS, in *Ancient Geography*, a river of Affyria, which, as well as the Gorgus, are fuppofed to have flowed between the two cities of Nineveh and Seleucia. Thefe two rivers are now called, as fome have fuppofed, the Great Zab and Little Zab. Thevenot calls thefe rivers Zaib, but fpeaks only of one, which he faw fall into the Tigris: he calls it a large river, making it half as broad as the Tigris, and obferves, that it is very rapid, that its water is whitifh, and very cold; which he would feemingly account for by its falling from the mountains of Curdeftan, and being merely fnow-water.

CAPSA, or **CAPSE**, now *Gafsa*, one of the ftrong cities of Jugurtha, in Africa, concerning the fituation of which authors are difagreed. Ptolemy places one Capfa in the ancient Bizacium, upon a fmall river which falls into the gulf which is formed by the river Triton at its mouth; and the Itinerary of Antonine marks it between Telepte and Tacapé, fo that this Capfa was north of that which Salluft mentions. The latter Capfa of Salluft and of Ptolemy is placed in Numidia, amidft the deferts, and its foundation is afcribed to Hercules the Libyan. It was taken by Marius, according to the relation of Florus; and Orofius fays, that it was full of royal treafures. This city was destroyed in the war of Cæfar againft Scipio. Dr. Shaw (Trav. p. 124.) places Capfa or Gafsa 12 leagues to the S.E. by E. of Ferreanah (the ancient Telepté); and he infers from fome imperfect infcriptions that preferve the ancient name of the city, as well as that of "Jugis Aqua," particularly defcribed by Salluft, and appropriated to Capfa, that the Capfa of Salluft and Ptolemy were the fame; though Bochart and Cellarius have fuppofed the contrary. This Capfa was formerly encircled by ftrong walls, towers, and baffions; but it was taken and demolished by Occuba, a famous Arab general. The walls of the citadel are ftill remaining, as monuments of its ancient glory and ftrength, 24 fathoms in height and 5 thick, built of large fquare ftones, which

which have now acquired the solidity and firmness of a rock. The walls of the town were rebuilt by the inhabitants since their first demolition; but were afterwards destroyed by Jacob Almanzor, who sent a governor and troops into the province. In Marmol's time Capfa was very populous, abounding with stately mosques and other structures of superb and regular workmanship; but it is now occupied by an indigent people, fleeced and oppressed by the Tunese government. It is built on a rising ground, and near it are plantations of palms, olives, pistachios, and other fruit trees, beyond which, occupying a small extent, is an interchange only of barren hills and valleys. The water which refreshes these plantations arises from two fountains; the one within the citadel, the other in the centre of the city. The latter, supposed by Dr. Shaw to have been the "Jugis Aqua" of Sallust, (Bell. Jugurth. § 94.), and the "Tarmid" of Edrissi, (Geog. Nub. p. 86.) was formerly covered with a cupola. It is still walled round, and discharges itself into a large basin, designed originally for a bath. This fountain and the other unite before they leave the city, and form a pretty large brook, which, from the quantity of the water, and the rapidity of the stream, might continue its course to a great distance, were it not constantly employed and imbibed in the uses above-mentioned. The climate and inhabitants of Capfa are unhealthy. Both men and women dress handsomely, except their feet, which they cover with coarse shoes of bungling workmanship, and made of the rough skins of wild beasts, equally inconvenient and unbecoming. The authors of the Modern Universal History, (vol. xiv. p. 281, 8vo.) say, that its most probable situation is in N. lat. $33^{\circ} 15'$. and E. long. $9^{\circ} 3'$, 30 leagues from Teufera.

CAPSA, in *Geography*, a town of European Turkey, in Rumania.

CAPSARIUS, from *capfa*, *satchel*, in *Antiquity*, a servant who attended the Roman youth to school, carrying a satchel with their books in it, sometimes also called *librarianus*.

CAPSARIUS was also an attendant at the baths, who took charge of the vestments of those by whom they were frequented. The Capfarii, it should seem, at least in the latter days of the empire, had an officer particularly placed over them for the summary administration of justice. Dig. lib. i. tit. 15. § 3. *Adversus capfarios quoque, qui mercede servanda in balneis vestimenta suscipiunt, iudex est constitutus: ut si quid in servandis vestimentis fraudulentè admiserint, ipse cognoscat.*

CAPSARIUS, from *capfa*, *chest*, among the Roman Bankers, was he who had the care of the money chest, or coffer.

CAPSCHAC, or KIPSCHEK, in *Geography*, a considerable country of Tartary, which extends to Europe and Asia, between the Jark and the Nieper. It is the country from which the Cossacks sprung. It abounds in grain and cattle; and is subject to a khan and several other princes. The people are warriors. Its capital is SERAI.

CAPSELLA, in *Botany*, a name given by Cæsalpinus to *thlaspi bursa pastoris* of Linnæus, proposed by Jussieu, and received by Ventenat as a distinct genus, because it differs from the other species of *thlaspi*, in having a triangular, or rather inversely heart-shaped, silicle without a border.

CAPSICUM, Guinea pepper, (doubtful whether derived from καπνός, *to bite*, on account of the biting heat of the seed and pericarp, or from *capfa*, *a chest*, alluding to the form and structure of the pericarp.) Linn. Gen. 252. Schreb. 338. Willd. 384. Tourn. Inst. p. 152. Pl. 66. Gært. 773. Lam. Illust. 326. Juss. 126. Vent. ii. 374. (Pimento. Encyc. and Nouv. Dict.) Class and order, *pentandria monogynia*. Nat. Ord. *Lurida*, Linn. *Solanæ*, Juss. Vent.

Gen. Ch. *Cal.* perianth one-leafed, five-cleft, or five-toothed, erect, permanent. *Cor.* monopetalous, wheel-shaped; tube very short; border five-cleft, spreading, plaited; segments broad. *Stam.* five, awl-shaped, very small; anthers oblong, converging. *Pist.* germ egg-shaped; style thread-shaped, longer than the stamens; stigma obtuse. *Peric.* a dry berry, of different shapes, two or three-celled, hollow, coloured; receptacles adhering to the partition, dry. *Seeds* numerous, kidney-shaped, compressed.

Ess. Ch. *Corolla* wheel-shaped. *Berry* dry. *Seeds* compressed. Nearly allied to *solanum*, but differs from it in having a dry, not pulpy pericarp, in the pungent, burning taste of its seeds; and in its general habit, which is so much alike in all the species, that it is not easy to give them decisive specific characters. The great variety that is found in the form and colour of the fruit increases the difficulty, and makes it almost impossible to determine, in many cases, which are the distinct species, and which are only varieties. Linnæus, in his *Species Plantarum*, acknowledged only two species, one annual, the other shrubby, with a variety distinguished by its small, red, conical fruit. This variety he made a distinct species in his first *Mantissa* and *Systema Naturæ*, and added another with a somewhat shrubby, quadrangular stem. The old botanists mention many kinds. Miller has ten species, besides varieties; but several of his species are now esteemed only varieties. Six of them are herbaceous and annual; at least, as he found by experience, they are such in our stoves, their stems decaying soon after the fruit is ripe: but it may be doubted whether some that are perennial in their native climates, may not become annual under our artificial treatment. In the enumeration of species, we shall take La Marck and Poiret for our guides.

Sp. 1. *C. annuum*, Linn. Sp. Pl. Gært. tab. 132. fig. 2. Woodville Med. Bot. tab. 144. (Piper Indicum vulgatifolium, Bauh. Pin. 102. Vallia-capo-Molago, Rhæd. Mal. ii. tab. 35.) "Stem herbaceous; peduncles solitary; fruit oblong." *Root* fibrous. *Stem* one to four or five feet high, nearly simple, round, a little striated, smooth. *Leaves* egg-shaped, acuminate, entire, petioled, placed in no regular order; petioles long, flexible, generally smooth, but sometimes, as well as the stem, a little pubescent. *Flowers* white, lateral; peduncles long. *Fruit* smooth and shining, very variable in its form and colour; in some instances long, straight, acute; in others short, thick, obtuse, and even emarginate at its summit: in some red; in others yellow; and sometimes both colours on the same plant; in some, according to Miller, upright; in others pendant, which has induced us to omit the word pendant, inserted by La Marck in the specific character, although those plants in Miller's possession, which had upright fruit, may possibly belong to one of the following species. A native of the East and West Indies. 2. *C. frutescens*, Linn. Sp. Pl. Lam. Ill. tab. 116. fig. 2. (*C. brasiliense*, Clus. Exot. 340. fig. 2. *C. indicum*, Rumph. Amb. tab. 38. fig. 3. *C. siliqua oliviformi*, Tourn. Inst. 153.) "Stem shrubby; leaves lanceolate; fruit oblong, solitary, rather erect." *Stem* a little rough, nearly round, and like the other parts of the plants, a little pubescent; branches numerous, stiff, angular. *Leaves* alternate, or two together, or opposite to the young branches, lanceolate-egg-shaped, or acuminate, with yellowish nerves underneath, on short petioles. *Flowers* small, white, or yellowish, placed a little above the axils of the leaves; peduncle long, almost straight, thread-shaped, thickened at the top when the fruit ripens, as in all the other species; calyx almost truncate, with five very short teeth; segments of the corolla almost lanceolate, acute, spreading. *Fruit* oblong, obtuse,

obtuse, the form and size of a small olive, reddish yellow. A native of the Indies, and the isle of Ceylon. 3. *C. cerasiforme*, Lam. Illust. Willd. (Piper filiqua parva, J. Bauh. ii. p. 944, Icon.) "Stem inclining to shrubby; fruit nearly globular, solitary, erect." Nearly allied to the preceding. *Stem* smooth, a little quadrangular, branched. *Leaves* scattered, smooth, lanceolate, acuminate. *Flowers* yellowish white, on long peduncles; calyx short, bell-shaped, truncate, very slightly toothed. *Fruit* about the size of a cherry, red or yellow. A native of Brazil. 4. *C. baccatum*, bird-pepper, Linn. Mant. (*C. frutescens*, β . Sp. Pl. *C. fructu minimo*, Brown. Jam. 176. *C. minus fructu parvo*, Sloane Jam. 112. Hist. tab. 146. fig. 2. β . *C. minimum*, Mil. n. 10?) "Stem inclining to shrubby, even; peduncles often in pairs; fruit very small." *Stem* striated, roundish, almost smooth; branches divaricated, zigzag. *Leaves* alternate, petioled, almost heart-shaped, acuminate, tender, smooth, nerved beneath. *Flowers* often in pairs, very small, yellowish white; peduncles unequal, united at their base, straight, pubescent; calyx short, nearly smooth, with five awl-shaped teeth; segments of the corolla short, obtuse. *Fruit* globular, a little oval, scarcely larger than a pea, smooth, red or yellowish; peduncle straight; Miller's minimum has leaves a little rounded at their summit, not acuminate. A native of the Indies. 5. *C. grossum*, Linn. Mant. (*C. fructu longo*, per summum tetragonum, Tour. Inst. p. 152. *C. tetragonum*, Mil. n. 3?) "Stem inclining to shrubby; fruit erect, thickened, somewhat heart-shaped." *Stem* slightly pubescent, angular, compressed towards the summit. *Leaves* tender, alternate, lanceolate-egg-shaped, acute, scarcely longer than the petiole. *Flowers* almost axillary, solitary; peduncles straight. *Fruit* bright red, globular, sometimes a little angular, emarginate, nearly the size of an orange; peduncles a little curved. A native of the Indies. 6. *C. sinense*, Lam. Willd. Jacq. Hort. iii. tab. 67. "Stem inclining to shrubby; peduncles either fasciculated or in pairs; fruit conical, very small, pendulous." *Stem* smooth, striated; branches numerous, zigzag, divaricated, angular. *Leaves* egg-shaped, rather large, sharply acuminate; petioles a little pubescent, slender. *Flowers* yellowish white, either four or five together, or in pairs; peduncles an inch long, curved near the top; segments of the corolla obtuse. *Fruit* small, egg-shaped, terminated by the permanent pistil, yellowish. A native of China. 7. *C. conicum*, Lam. Ill. (*C. conoides*, Mil.) "Stem inclining to shrubby; fruit egg-shaped-conical, erect." Distinguished from some of the preceding chiefly by its fruit, which is about half an inch long, bright red, a little bellying at its base, narrowed at the summit into an obtuse cone, and generally standing upright on a curved peduncle. A native of the Indies. 8. *C. luteum*, Lam. Illust. "Stem inclining to shrubby, zigzag; little branches and petioles hairy; fruit egg-shaped, pendulous, three-celled." *Stem* nearly quadrangular, pubescent. *Leaves* tender, egg-shaped, acute, smooth. *Flowers* small, whitish, solitary, or several together; divisions of the corolla short, acute. *Fruit* yellow, oblong, of a moderate size. Found in the East Indies by Sonnerat.

All the species of capicum have the same general qualities, which are sensible in every part of the plant. The fruit is much used for culinary purposes in its native countries, and has long since been introduced into Europe as a poignant ingredient in soups and high-seasoned dishes. Its taste is extremely acrimonious, and leaves a durable sensation of heat on the palate. When taken in small quantities it is a grateful stimulant; but if used to excess, it has a painful effect, and seems to set the mouth on fire. In hot climates, where only it is indigenous, a liberal use of it is found to be salutary in strengthening the stomach, assisting

digestion, and correcting that putrescent colliquation of the humours which those climates have a tendency to produce. The smaller kinds of the fruit are most in request. The fruit of capicum baccatum in particular, gathered when ripe, dried in the sun, and then pounded and mixed with salt, is kept stoped in bottles, and known in the West Indies by the name of Cayenne butter. Pepper-pot, according to Miller, is made of the same species, or of that variety of it which he calls *minimum*. For this purpose the ripe fruit is first dried in the sun, then put into an earthen or stone pot, with a layer of flour between each layer of fruit, and baked in an oven till it is perfectly dried. It is then cleaned from the flour, and beaten or ground to fine powder. To every ounce of this powder, a pound of wheat flour is added, and the mixture made into small cakes with leaven: these are baked, cut into small pieces, and baked again till they are as hard as biscuit, then beaten into powder and sifted. The result is the well known Cayenne pepper. Capicum grossum is most proper for pickling, the skin being more fleshy and tender than in the other species. The fruit should be gathered before it comes to its full size, should be slit down on one side to get out the seeds, and soaked two or three days in salt and water. After it is well drained, it should be covered with boiling vinegar, and closely stopped down for two months. It should finally be boiled in vinegar to make it green, and will want no addition of spice. If the ripe fruit of any of the species be thrown into the fire, it produces a noisome vapour which occasions vehement sneezing and coughing, and sometimes vomiting. The powder taken up the nose will cause violent and dangerous fits of sneezing. Cayenne pepper, though its powerful properties have been so long known, has but lately been introduced as a medicine. It is now used both externally and internally to promote excitement, where the bodily organs are languid and torpid, and according to Dr. Woodville, as an aromatic of the most acrid and stimulating kind, may certainly be found efficacious in some paralytic and gouty cafes. The French authors of *Démonstrations de Botanique*, state it to be a powerful stomachic, and assert that six grains in powder mixed with honey, taken every morning, is a true specific for hypochondriacal disorders, and those head-aches which proceed from a relaxed stomach. It has been successfully exhibited in cynanche maligna, and in what Dr. Mackitrick calls *cachexia Africana*, which he considers as the most frequent and fatal predisposition to disease among negroes. The dose he directs is from six to eight grains. Bergius gave the seeds of capicum with great success in inveterate intermittents.

The annual capicum, which is the most hardy, is cultivated in Spain, Portugal, and the south of France, in the open air, for the sake of its fruit, which, particularly in Languedoc and Provence, is eaten green by the peasants at their breakfast, and preferred to onions or garlick. In that state it is also pickled and used instead of capers. The ripe fruit is employed in various articles of cookery. In England the different species are cultivated chiefly for ornament, and their beauty depends in a great degree on the various and brilliant colours of the ripe fruit, which, intermixed with the green leaves and white flowers, all flourishing at the same time, makes a pleasing appearance in the green-house, or the borders of the flower garden. The hardier annual species or varieties are propagated by seeds, which must be sown upon a hot-bed in the spring, and when the plants have six leaves, they should be transplanted into another hot bed at the distance of four or five inches from each other, and in warm weather should be allowed a good deal of fresh air. Towards the end of May, they should be hardened by degrees to bear the open air, and in June may be transplanted

into

into borders of rich earth. They will flower about the end of June, and will ripen their fruit in autumn. The perennial shrubby sorts, after they have been brought forward in the hot-bed, as before directed for the annual ones, should be planted singly in pots filled with rich earth, and plunged into a very moderate hot-bed, under a deep frame, where they may have room to advance. In the day-time, in warm weather, they should have plenty of air, but must be covered with glasses every night, and should be frequently watered. On the first approach of frost, they must be removed into the stove, where they may have a temperate warmth. The fruit will continue in beauty most part of the winter.

CAPSIZE, *to*, in *Naval Language*, to upset, or turn over any thing.

CAP-SQUARE, in *Artillery*, a strong plate, generally of iron, which goes over the trunnion hole in each cheek of a gun-carriage, and is there curved or bent upwards into an arc, sometimes of about 120°, but generally into a semicircular one nearly so as to form with the said hole, (that is sometimes let down into the cheek about two thirds of the diameter of the trunnion, but most commonly so as to have its centre about a quarter of an inch only below the upper surface of the cheek) a circle capable of receiving the same. It is fastened to the prise-plate by a hinge in the joint-bolt, by means of which, it is raised up or let down when wanted. The cap-squares, when fastened down by means of the eye-bolts, or fore locks and keys, keep the trunnions in their holes and the guns on their carriages. There are two of them on every gun-carriage, viz. one on each cheek.

CAPSTAN, a large massy column shaped like a truncated cone, and passing perpendicularly through the deck of a ship, and turned by levers, or bars, which pass through holes pierced in its upper extremity; serving, by means of a cable which winds round the barrel, to draw up burdens fastened to the end of the cable. By the capstan vessels are drawn ashore, and hoisted up to be refitted; anchors weighed, and sails hoisted, cargoes discharged or taken in, &c.

The word is also written *capstaud*, *capstern*, and even *capstow*. It is formed from the French *cabestan*, which signifies the same.

The power of the capstan is reducible to that of the *AXIS in peritrochio*.

The common moveable capstan is exhibited in *Plate III. Mechanics*, *fig. 15*. A is the shaft, into the top of which four handspikes, B, C, D, E, are put, for the men to turn by: this shaft passes through a collar at G, and works in a hole in the piece H; at F the rope is passed twice round the barrel, and to keep it from slipping when the barrel is turned, a man constantly pulls at the end or part J: this machine is prevented from moving by stakes, K, K, driven into the ground. Sometimes, instead of using the common barrel, AF, *fig. 15*, a double one, *fig. 16*, is used. A, B are the two barrels, the one A being smaller than the other; CC is the running rope, one end of which is fastened to the barrel B, and the other to the barrel A; in such a manner, that when the shaft is turned, by means of the bar, CD, one barrel will wind on the rope, and the other will wind it off; the middle of the rope goes round a pulley, D, which is hooked to the great rope E. When the machine is turned, so that the great barrel B winds on the rope C, and the little one A at the same time winds it off, it is plain that the great one takes up more rope than the other can supply, and it must therefore draw forwards the rope E; and if the two barrels are nearly of a size, the pulley D will advance very slowly, and with proportionally great power.

This capstan might easily be converted into a crane, or windlass, for raising weights, merely by giving the compound barrel, AB, an horizontal position, and substituting a winch instead of the bar, CD. See **CRANE**. Dr. Robinson ascribes the invention of this kind of capstan to an un instructed but ingenious country tradesman. *Encyclop. Brit. Suppl. art. Machinery*, vol. xx. p. 107. It appears, however, says Mr. Brewster, in his late edition of "Ferguson's Lectures on select Subjects," (vol. ii. p. 377.) to be the invention of the celebrated George Eckhardt, and likewise of Mr. Robert McKean of Philadelphia, son to the present governor of Pennsylvania.

Fig. 17 represents the capstan used at the London docks for hauling the ships in and out of the entrance-locks. AB is a cast-iron shaft, the lower end B of which works in a hole or socket in the bottom of a well; at A it moves in a collar in a cast-iron plate fixed over the top of the well, and which acts as a cover thereto: by having these two centres at a considerable distance from each other, the capstan works very steadily. At the upper end of this shaft is a cast iron wheel, E, whose four spokes are hollow to receive the handspikes by which it is turned; F is the conical barrel on which the rope is wound.

There are commonly two capstans in a ship of war; the *main-capstan* placed behind the main-mast, standing on the first deck, and reaching four or five feet above the second: this is also called the *double-capstan*, because it has two drum-heads, and serves two decks for drawing of anchors; and because its force may be doubled by applying hands on each deck. It has bars, whelps, &c. for turning and stopping it. See *Plate III. Mechanics*, *fig. 18*. The other is the *jeer-capstan*, or *little-capstan*: this stands on the second deck, between the main-mast and the mizen: its use is, chiefly, to heave upon the jeer-rope, or to heave upon the viol, to hold off by when the anchor is weighed; and on other occasions where a less force is required, than to weigh the anchors, &c. See *fig. 19*.

The French call that an *English capstan* where there are only half-bars used: and which, for that reason, is only half perforated: this is thicker than the others.

There is also a *flying capstan*, which may be moved from place to place.

The parts of a capstan are, the foot *d*, which is the lowest part; the spindle *f*, the smallest part of which turns round in an iron socket, called the saucer; the whelps, *b*, a sort of brackets set into the body of the capstan close under the bars, and reaching downwards from the lower part of the drum-head to the deck; the barrel A, the main body of the whole; the drum-head *c*, which is a broad cylindric piece of wood fixed above the barrel and whelps, in which are the holes for the bars to be put into; the bars, which are small pieces of timber by which the men heave; the pins, as *e*, which are little bolts of iron, thrust perpendicularly through the holes of the drum-head, and through a correspondent hole in the end of the bar, made to receive them when the bars are fixed; the pawls, which are pieces of iron bolted to one end of the beams of the deck, close to the body of the capstan, but so as that it have liberty to turn about every way; and against them do the whelps of the capstan bear; so as that by them the capstan may be stopped from turning back. There are also hanging pawls, as *g, g*, *fig. 18*, which reach from the deck above to the drum-head immediately beneath it; and lastly, the swifter, which is a rope passed horizontally through holes in the outer ends of the bars and drawn tight, designed to keep the men steady whilst they work, and to afford room for a greater number to work at once.

An important improvement has lately been proposed to the capstan by capt. Hamilton of the royal navy, which is that of reducing the number of whelps from six to five, making the lower part more obtuse, and filling it up circular by the chocks, and also making the upper part more perpendicular in the sides, and open, the whelps being a portion of a circle.

Several improvements in the structure of the capstan were proposed to the Academy of Sciences at Paris, in consequence of the prize offered by the Academy from the year 1739 to 1741. Seven memoirs on this subject were published in the 5th volume of the prize pieces, forming a detail of 296 pages in 4to. The last improvement was suggested by Stephen-Charles de la Lande, formerly professor of mathematics in the military school. A report on this subject was made to the "Bureau de Consultation" in 1794. The method which he proposes for obviating the inconvenience to which the common capstan is subject, when different rounds of rope are coiled about the barrel, by means of a screw or spiral placed round the capstan, is particularly described in the supplement to Montucla's "Hist. de Mathématiques," vol. iv. p. 585—588.

In *fig. 20.* are shewn Mr. Plucknett's patent additions to a capstan, which save the time and trouble of furling the messenger, or rope, by which the cable is hauled in. A is a double circular inclined plane, cut in the deck under the capstan. B, C, D, are lifters of cast-iron, shewn in *fig. 21.* having a broad flat head, *a*, and a square bar, *b*, with a wheel, *c*, in the bottom of it, which runs on the inclined plane, A, the square part, *b*, *fig. 2.* works through the pawl-wheel, E, *fig. 20.* When the capstan is turned, the lifters running on the inclined plane below, will move up and down; and when the rope has wound itself down to the bottom of the capstan, they will push it up again, as shewn at B and C, *fig. 20.* These capstans are now in use in many ships of war, as well as merchant-men, and answer the purpose very well.

The terms belonging to the use of the capstan are, *rig the capstan*, i. e. fix the bars in their respective holes, thrusting in the pins in order to confine them; *heave the capstan*, i. e. go round with it heaving on the bars; *furge the capstan*; and *come up capstan*, that is, slacken and let go the cable which you heave by; in a like sense they also say, *launch out the capstan*; *pawl the capstan*, or fix the pawls to prevent it from recoiling during any interval or pause in heaving.

CAPSTAN-BARS, the pieces of wood employed in heaving round the capstan.

CAPSULA, or **CAPSELLA**, denotes a bag, pouch, or receptacle of divers kinds of things.

The word is a diminutive of the Latin *capsa*, literally signifying a little box, or case; particularly a bag, or satchel, wherein boys carry their books, &c. to school.

CAPSULA, in *Chemistry*, is an earthen vessel, in form of a pan; wherein things are frequently placed, that are to undergo very violent operations of the fire.

CAPSULA Glissoni, in *Anatomy*, is the anterior or right margin of the lesser omentum, (omentum minus sive gastrophenticum) which contains several vessels and nerves belonging to the liver and gall-bladder, connected and surrounded by cellular and adipose substance. For a further account of this part, see **LIVER** and **PERITONEUM**.

CAPSULA Communis of the vena portarum, is a covering of firm and compact cellular substance, surrounding the trunk of the vena portarum, and attending its ramifications throughout the liver, where it includes also the concomitant branches of the hepatic artery and ductus hepaticus. See **LIVER**.

CAPSULÆ Atrabiliarie, or **renales**, the glandular bodies which are situated above the kidneys, and which are also described under the names of glandulæ renales, or supra-renales, and renes succenturiati. See **KIDNEY**.

CAPSULE, in *Botany*, (capsula, Lat. a little box) according to Linnæus is a hollow pericarp, or seed-vessel, which opens spontaneously in a determinate manner, but differently in different plants, to afford a passage for the ripened seeds. Gærtner in his excellent work, "*De Fructibus et Seminibus Plantarum*," uses the term in a more extensive sense, and states it to be a dry conceptacle, either membranous, coriaceous, or woody, sometimes without valves, but much more frequently opening by the means of valves, which differ from each other in number, situation, and figure. He divides it into four species; utricle, samara, follicle, and capsule in the strictest sense of the word. To pass over the evident want of logical precision in giving the same name to a whole, and to one of its parts in contradistinction to the rest, the first two, not opening spontaneously, may be much more advantageously considered as distinct kinds of pericarp. See those words. The follicle of Gærtner corresponds with that of Linnæus in his *Système Naturel*, and practical works. He had called it conceptacle in the *Philosophia Botanica*, and uniformly separates it from the capsule: but as it possesses all the characters expressed in his definition of a capsule, it would doubtless be more proper to treat it as a particular modification of that kind of seed-vessel. See **FOLLICLE**.

Capsules differ from each other with respect to their number, the consistence of their outward covering, their external form, their internal division, and their mode of dehiscence, or opening.

1. With respect to their number, they are either single, as in lychnis, papaver, and the greatest number of plants; or more than one in the same simple flower; either completely separate from each other, as in pæonia, caltha, and sedum; or more or less united, towards the bottom, as in dictamnus, nearly in their whole length as in staphyllæa, or still more intimately as in those which are called coccous, or grained. The last are described by Linnæus and most other botanists as consisting of only one capsule; but since each of the cocci or grains has the same mode of dehiscence as occurs in pæonia, dictamnus, and others which are universally deemed polycapsular, it seems more consonant with nature to consider them as distinct. Those of ceanothus americanus are said by Gærtner to separate spontaneously from each other in a state of maturity. It must be acknowledged, however, that when the various capsules of this kind are compared together, they are found gradually to recede from the polycapsular character, till at length they are so closely united, that it is not easy to draw a precise line of distinction between them and those which are strictly one.

2. With respect to the consistence of their outward covering, they are membranous, as in oxalis; coriaceous, or resembling leather, as in æsculus; fleshy, or succulent, as in pontederia; or woody, as in bankia and cedrela.

3. With respect to their external form, by far the greater number of capsules are roundish, or egg-shaped; but they are sometimes globular, as in centunculus and hottonia; cylindrical, as in dianthus; inversely heart-shaped, as in veronica; angular, as in campanula; trigonous, or three-sided, as in polemonium; four-sided, as in parnassia; five-sided, as in linum; three-furrowed, as in canna; three-lobed, as in crocus; and so passing gradually to the compound capsule, which

which is didymous, or two-grained, as in *mercurialis*; three-grained, as in *euphorbia*; five-grained, as in *ayenia*.

4. With respect to their internal division, they consist of one or more cells, (loculamenta.) When there are two or more cells, the substance by which they are separated is called the dissepiment, or partition; and the central column, the columella. See those words. Some of the cells frequently become abortive as the fruit ripens, and sometimes entirely disappear. The only method of determining their natural number with certainty is, to make a transverse section of the germ at an earlier period of the flower.

5. With respect to their mode of dehiscence, or opening, they are one, two, three, four, five, or many-valved. A capsule is said to be one-valved when it does not separate into distinct parts. Capsules of this kind open in various ways. 1. With lateral holes; about the middle, as in most species of *campanula*; near the base, as in *trachelium*; and near the summit, as in *papaver*. 2. With a single longitudinal slit, or chink, (rima); extending but a little below the summit, as in *staphyllæa*; to the middle, as in *colchicum*; and from the top almost to the bottom, as in *butomus*, *caltha*, and many others. This slit is generally on the inner or concave side; but is found on the outer or convex one in *magnolia*, *ægicera*, and a few more. 3. With a short transverse slit on the summit, as in *oldenlandia* and *hedyotis*. 4. With an entire round hole at the summit, as in *jassione* and *roella*; or with three, as in *antirrhinum orontium*. 5. With short teeth, as in *cerastium*; or with deeper divisions, but not so low as the middle (bifariam, &c. dehiscentes), as in *dianthus* and *agrostemma*. If the divisions descend to the middle of the capsule, it is said to be semi-valved; and if still lower down, whether they reach the base or not, it is called by Linnæus two or more-valved, according to their number; two-valved, as in *circæa*; three-valved, as in *incrocus* and *epilobium*; four-valved, as in *parnassia*; five-valved, as in *drosera*, &c. Gærtner calls every longitudinal division a valve, although it be only a minute tooth, which seems preferable to the arbitrary distinction made by Linnæus, without any essential difference; but it would, as we conceive, be still better to give that name only to such as extend to the base of the capsule. They open either from the top, as in *epilobium*, and most other genera; or from the base, as in *circæa*. Gærtner asserts, that this difference is of no importance: but however inconsiderable it may appear in the eye of the physiologist, it ought by no means to be passed over in silence by the discriminating and arranging botanist.

Capsules are more than one-valved: 1. When they split longitudinally from the summit, or the base, into two or more divisions: 2. When they split longitudinally with more than one chink, leaving the summit and the base entire, as in *oxalis*, *xylis*, and many of the *orchidææ*: 3. When they divide transversely into two segments, appearing as if they had been cut round, (circumscissæ); about the middle, as in *anagallis*; near the summit, as in *hyoscyamus*; or a little above the base, as in *trianthema*.

CAPSULE of the crystalline lens, in *Anatomy*, a production of the membrana hyaloidea, which surrounds the crystalline humour, and retains it in its situation. See *EYE*, *Anatomy of*.

CAPSULATE PLANTS, CAPSULATE PLANTS, are such as have a tetrapetalous regular flower, consisting of four distinct petals in each flower, and which bear their seeds in short capsule: by which they are distinguished from the *siliquosæ*, which have their seed in long cases, or pods.

CAPTAIN, in French, *capitaine*. This word, in its ordinary acceptance, signifies an officer who commands a company, whether it be a troop of cavalry or a company of in-

fantry or artillery. This word had formerly a much more general meaning than it has at present. For it denoted the commander in chief of an army or body of troops. And in this sense we still make use of it when we say, that Amilcar, Annibal, Scipio, Cæsar, Turenne, Conde, Marlborough, Eugene, &c. were great captains. It was the name first given to the chief, head, or commander of a troop, company, or any other body of men by land or sea.

A captain used to be a very considerable officer, and had the command of a thousand, sometimes of four thousand, and sometimes of a greater number of men.

From the time of Louis XII. to that of Henry IV. persons most distinguished for their conduct in the French armies were called captains.

In the legions of six thousand men each, that were instituted by Francis I. every captain commanded one thousand men, who were divided into ten centuries, commanded each by an officer who had not the name of captain, but that of centenier or centurion.

There have been instances in France of officers commanding corps from four to six thousand men under the sole title of captain. But these large bodies so commanded were composed of strangers or foreigners, as Scots, Germans, Swiss, Italians, whom gentlemen of these nations brought into the service of the French kings, a practice that continued even under Louis XIII.

In the most remote times of the ancient French militia the name of captain was not given to their officers except the generals. Those, who commanded under the dukes and counts were the viguiers and the centeniers, during the first and second races of their kings.

But when their sovereigns, besides employing the troops of their vassals, gave commissions to certain seigniors to raise companies of gens d'armes, these seigniors took the title of captain in the sense annexed to it at present. In the business of war, this appellation indeed has always denoted a commandant or chief of troops or soldiers. In the old French romances that of *chevetaine*, which comes from the word chef or chief, is sometimes made use of. And captain comes from *caput*, which also signifies chief.

The rank of captain, in the ordinary acceptance of the word is between that of a major and that of a lieutenant. A captain commandant is he who commands in chief a company or has the chief command of a company.

In every nation almost, and in every service, there are captains of different denominations by the addition of other words expressive of the functions or duties of those, on whom the compounded appellations are bestowed.

We for instance make use of the compound term *Captain General*. By the constitution the king is captain general or generalissimo of all the forces in his united kingdoms of Great Britain and Ireland and their dependencies. The term comprehends the first military rank, power, and authority in the realm. In 1799 his majesty was pleased to delegate this rank with the powers and authorities annexed to it to his royal highness the duke of York.

Captain Lieutenant. This compound term in our service denotes the commanding officer of the colonel's troop or company in every regiment, when the colonel is either absent or gives up the command of it to him. By an order in 1772 this officer takes rank as a full captain, and by a late regulation he succeeds to the first vacant troop or company, the price of a captain-lieutenancy and of a company being now the same. The title of captain-lieutenant is still made use of in foreign countries.

A *captain reformed* is one, who on a reduction of the army

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at the termination of a war and the re-establishment of peace, loses his company but retains his rank and pay, whether he be on duty or not.

A *captain on half pay* is one who loses his company on a reduction of an army and retires on half pay, until seniority or a call for his services, puts him again on duty and full pay.

A *captain en second*, or second captain, is one, whose company has been broken up, and who is joined to another to serve under the captain of it, during whose absence, through sickness or otherwise, he commands.

The French, by annexing others to the word captain, multiplied the compound denominations of this title to a great degree. Of these the following are the principal :

- Capitaine general.
- Capitaine lieutenant.
- Capitaine en second.
- Capitaines des portes.
- Capitaine réformé.
- Capitaine conducteur general d'artillerie.
- Capitaine des guides.
- Capitaine des charrois.
- Capitaine général des charrois de l'artillerie.
- Capitaine général des vivres.
- Capitaine des mulets.
- Capitaine des ouvriers.
- Capitaine conducteur d'artillerie.
- Capitaine de mineurs.
- Capitaine eu pied.
- Capitaine en pied sur un vaisseau de guerre.
- Capitaine de port.
- Capitaine d'armes.
- Capitaine des gardes du corps du roi.
- Capitaine des cent gardes Suisses du roi.
- Capitaine des gardes de la porte du roi.
- Capitaine des gardes de la prévôté de l'hotel du roi.
- Capitaine des gendarmes de la garde du roi.
- Capitaine des chevaux legers de la garde du roi.
- Capitaine aux gardes Françaises.
- Capitaines en second aux gardes Françaises.
- Capitaines aux gardes Suisses.
- Capitaines dans la gendarmerie de France.
- Capitaines des gardes du corps du Monsieur frère du roi.
- Capitaine des Suisses de la garde ordinaire du corps de Monsieur frère du roi.
- Capitaines des gardes du corps de Monseigneur le comte d'Artois frère du roi.
- Capitaine des Suisses de la garde ordinaire de Monseigneur le comte d'Artois frère du roi.
- Capitaines commandants d'infanterie Française.
- Capitaines commandants des grenadiers.
- Capitaines commandants de chasseurs.
- Capitaines a la suite des regiments de l'infanterie.
- Capitaines a la suite de l'infanterie.
- Capitaines a la suite des places.
- Capitaines dans le regiment Suisses.
- Capitaines commandants dans les regiments Allemands.
- Capitaines commandants dans les regiments Irlandois.
- Capitaines commandants dans les regiments Italiens.
- Capitaines commandants dans les regiments Corfes.
- Capitaine des grenadiers royaux.
- Capitaines dans les regiments provinciaux d'artillerie.
- Capitaines dans les regiments provinciaux d'état major.
- Capitaines dans les bataillons d'état major.
- Capitaines commandants dans la cavalerie.
- Capitaines a la suite d'un regiment de cavalerie.
- Capitaines a la suite de la cavalerie.

Capitaines de cavalerie a la suite des places.

Capitaines commandants de carabiniers.

Capitaines attachés au corps des carabiniers.

Capitaines commandants de chevaux legers.

Capitaines commandants de houffards.

Capitaines a la suite des houffards.

Capitaines commandants de dragons.

Capitaines de dragons a la suite d'un regiment.

Capitaines a la suite des dragons.

Capitaines de dragons a la suite des places.

Capitaines commandants de chasseurs a cheval.

Capitaines dans le corps du genie.

Capitaine commandant la compagnie des cadets gentils hommes dans l'école militaire.

There are also captains of several different denominations in their corps of artillery.

Since the revolution in France some of these denominations have ceased, and some of them have been changed into others. It is not therefore our intention to give a description of each of them. We will only take notice of some of the principal ones, and then speak of the knowledge and qualifications which captains ought to possess.

The title of *captain general*, or *capitaine general*, is very ancient in France, and conferred an almost unlimited command on the person who possessed it, in the district where he commanded. But it never corresponded to that of generalissimo or extended to the whole French army but in the case of the duke of Savoy in 1635, in the time of Louis XIII. This title was revived by cardinal Mazarin in 1656 in favour of the marquis de Castlemont and the marquis d'Uxelles, but not with such extensive powers. For they were under the orders of the marshal of France, and it only in fact gave the command of all lieutenant generals. It was also conferred on others, as Messieurs de Crequi, d'Humieres, de Bellefons, and de Gadagni. But it did not continue long in existence. The count de Tessé also had the title of captain general in Italy in 1702.

In Spain the rank of a captain general corresponds with that of a marshal of France, who has the command of an army.

Capitaine conducteur general d'artillerie, or captain-conductor general of artillery, is the person who commands all the captain conductors of artillery. He has charge of the equipages and takes care that they are properly arranged and march according to the orders of the general officer of artillery, which are transmitted to him by the commanders of the equipages of artillery.

Capitaine general des charrois de l'artillerie, the captain general of artillery-carriages, or the captain general of the carriage of artillery. This person ought always to be a man of much experience as well as of a naturally good and correct understanding with a clear arrangement of ideas. He has the command and direction of the whole carriage of the artillery.

Capitaine des guides, or captain of the guides, is the person charged with the assembling, choosing, forming and furnishing of guides. He ought to understand different languages, and particularly that of the country, in which the army is carrying on its operations. He should be active, vigilant, and intelligent, practised in interrogating the guides he assembles, expert in discovering which of them are best acquainted with such or such a district or tract of country, in which of them he can place most confidence, and who amongst them are fittest to be employed as spies. As the army advances he dismisses those that are found to be useless and chooses others. He furnishes some of them on foot and some

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some mounted, and for this purpose procures both provisions and horses with forage from places in the neighbourhood of the army.

He encamps near the general's quarters, and when the general mounts on horseback to reconnoitre, he accompanies him with the most intelligent of the guides.

Of the knowledge which it is necessary for captains to possess.

That an officer of this rank ought to be well acquainted with every thing necessary for the proper discharge of the duties incident to his command or situation either in peace or war, in garrison or in the field, is a position, too obvious to be disputed, and requires no proof.

A captain then ought to understand the languages most generally spoken in Europe, and particularly that of the country with which the nation he belongs to is most frequently at war.

He should be acquainted with geography in general, and more especially with that of the country or countries in which his nation is carrying on war. He should know the directions and extent of the principal hills and mountains in them, the courses of the principal rivers, their depth and fording places, how far they are navigable by small vessels, by row-boats, or by canoes, the situations of the principal roads, bridges, desiles, fortified places, &c. &c. in them.

He ought to be well versed in history, particularly that of his own country; and should not only be acquainted with the best and most faithful accounts or narratives of battles, both ancient and modern, but ought to examine attentively and minutely the circumstances mentioned as attending each of them, and contributing chiefly to its failure or success. Such a course of study and reflection will soon enable him to acquire a knowledge of military management, resources, and expedients, greatly beyond that which his own experience might ever afford him. When placed in an unusual or trying situation, he will find in it something similar or unlike to what he had before read or thought of, which resemblance or dissimilitude will immediately suggest to him expedients, and means of extricating himself from difficulties. It is by such a judicious, careful, and attentive perusal of history that both the ablest generals and statesmen have been formed. For no man's experience alone, without the aid of study and reflection, is sufficient to make a man eminent in any profession.

A captain ought to be well acquainted, not only with the tactics, the manœuvres, the rules, and military regulations in the service of his own country, but also with the different branches of the art of war, and to extend his ideas and knowledge beyond the parade or a review. Regulations, in time of peace, deliver general principles; but they do not point out the happy application of them; which on service depends on the judicious regulations of military maxims by circumstances. He ought to understand what sort of works are best adapted to any particular situation or position; their form and destination; the manner of tracing or constructing them; the materials necessary for reveting them; the tools and utensils wanted for erecting them; and in short every branch of knowledge requisite for securing or fortifying any given position properly. He should likewise understand the method of increasing the strength of any post by means of inundations, mines, palisades, abattis, advanced works, lines of counter-approach, &c. &c. He should know well how to defend an open city, town or village, a house, a church, an old castle, a church-yard, a barn, a farm-house, a block-house, a pass or defile, a dike, a ravine, the passage of a river, a ford, a wood, &c.

A captain ought also to make himself well acquainted with the business and duty of an officer commanding an advanced

guard, an outpost, a foraging party, and every other sort of detachment.

A captain should likewise understand mathematics to at least a certain extent or degree. He should know the use of mathematical instruments and possess a sufficient knowledge of geometry for surveying and the measurement of heights and distances. He ought also to understand algebra, as far, at least, as quadratic equations.

A captain should also know how to sketch ground expeditiously, and to represent properly on paper the relative situations of hills, rising grounds, towns, villages, ravines, highways, and other roads, as well as the relative heights nearly of the different positions. But a knowledge that is merely confined to this, though it be necessary as an elementary part of instruction, is of but little value, and is calculated for rendering an officer vain and conceited, and for making him suppose that he knows every thing, whilst in reality he knows scarce any thing that he ought to know. He should be able to determine speedily whether one position be preferable to another, either for the reception of troops, or for the purposes of defence. He should know how to combine castles, houses, churches, church yards, dikes, fences, copses, woods, high-ways, &c. with field-works. He ought to understand the best methods of constructing such works, as well as the proper application of artillery to the attack and defence of field-positions. The doctrine of positions, and the combinations of attack and defence, form indeed the sublimest part of the art of war.

A captain, and indeed every other officer of engineers, ought to be thoroughly acquainted with fortification, the principles of construction both regular and irregular, of the attack and defence both of fortified places and field-positions, the theory of revetements and demi-revetements, the construction of batteries, &c. &c. independently of what they should know in common with other officers.

A captain, or other officer of artillery, exclusive of what he ought to know in common with the rest of the army, should be thoroughly acquainted with a variety of things peculiar to the service of his own corps. He should understand, as well as any engineer whatsoever, the construction of batteries; the situations and services to which different sorts of ordnance are best adapted; in what circumstances it is better to make use of shells and hollow shot, than solid ones, and of howitzers and mortars, than cannon; the preparing and making up of ammunition; the charges best suited to various services and situations; the practice of firing *en ricochet*; the windage fittest for different sorts and pieces of ordnance; the theory of projectiles both in vacuo and in the air; the construction of guns and gun-carriages; &c. &c.

As to the physical qualities or qualifications of captains, they ought to possess good constitutions, and to be capable of enduring the continuance of fatigue, which is of the first consequence on actual service. Troops without these qualities, let their arms and dress be ever so favourable for expedition, cannot make long and rapid marches, or perform their movements with celerity, which, *ceteris paribus*, will always ensure success to the army, that possesses it in the greatest degree. He should also possess courage, or personal bravery, as well as coolness or steadiness in every situation. He ought likewise to enjoy distinct vision to prevent confusion and mistakes. For though Hannibal both fought and won some great and important battles after he lost the sight of one eye, every officer is not in point of talents, contrivance, and abilities, an Hannibal.

As to his moral qualities, he ought to be honourable, just, temperate, free from drunkenness, gambling, and every

every other species of debauchery and dissipation, exemplary in his conduct, conciliating in his manners, not given to quarrelling, attentive to the comfort of his soldiers, obedient and respectful to his superiors, mild and humane towards his inferiors, a preserver of strict discipline, and at the same time an enemy to severe and ignominious punishments.

CAPTAIN-bashaw, signifies the Turkish high-admiral. See *BASHAW*.

He possesses the third office in the empire, and is invested with the same power at sea that the vizir has on shore. Solyman II. instituted this office in favour of the famous Barbarossa; with absolute authority over the officers of marine and arsenal, whom he may punish, cashier, or put to death, as soon as he is without the Dardanelles. He commands in chief in all the maritime countries, cities, castles, &c. and at Constantinople is the first magistrate of police in the villages on the side of the Porte, and the canal of the Black Sea. The mark of his authority is a large Indian cane, which he carries in his hand, both in the arsenal and in the army.

The captain-bashaw enjoys two sorts of revenues; the one fixed and the other casual. The first arises from a capitation of the islands of the Archipelago, and certain governments in Nátolia and Gallipoli. The latter consists in the pay of the men who die during the campaign; in the fifth of all prizes made by the begs; in the profits accruing from the labour of the slaves, whom he hires as rowers to the grand signior; and in the contribution he exacts in all places where he passes.

CAPTAIN reis, or *CAPIDAN reis*, an appellation given by the Turks to the grand pilot, answering to pilot royal among the French.

CAPTAIN, a title given to persons commanding ships of war, carrying 20 guns or upwards. The commanders of ships in the service of the East India company are also styled captains; and the same title has descended, very improperly, to the masters of other vessels.

The charge of a captain in his majesty's navy is very comprehensive, inasmuch as he is not only answerable for any bad conduct in the military government, navigation, and equipment of the ship he commands, but also for any neglect of duty, or ill management, in his inferior officers, whose several charges he is appointed to superintend and regulate. On his first receiving information of the condition and quality of the ship he is appointed to command, he must attend her constantly, and hasten the necessary preparations to fit her for sea. So strict, indeed, are the injunctions laid on him by the lord high admiral, or commissioners of the admiralty, that he is forbid to lie out of his ship, from his arrival on board till the day of his discharge, unless by particular leave from the admiralty, or his commander in chief. He is enjoined to shew a laudable example of honour and virtue to the officers and men, and to discountenance all dissolute, immoral, and disorderly practices, and such as are contrary to the rules of discipline and subordination, as well as to correct those who are guilty of such offences as are punishable according to the usage of the sea. He is ordered particularly to survey all military stores which are sent on board, and to return whatever is deemed unfit for service. His diligence and application are required to procure his complement of men, observing carefully to enter only such as are fit for the necessary duty, that the government may not be put to improper expence. When his ship is fully manned, he is expected to keep the established number of men complete, and superintend the muster himself, if there is no clerk of the check at the port. When his ship is employed on a cruising

station, he is expected to keep the sea the whole length of time previously appointed; but if he is compelled, by some unexpected accident, to return to port sooner than the limited time, he ought to be very cautious in the choice of a good situation for anchoring, ordering the master, or other careful officer, to sound and discover the depths of water and dangers of the coast. Previous to any possibility of an engagement with the enemy, he is to quarter the officers and men to the necessary stations, according to their office and abilities, and to exercise them in the management of the artillery, that they may be more expert in the time of battle. His station, during the time of an engagement, is on the quarter-deck; at which time he is expected to take all opportunities of annoying his enemy, and improving every advantage over him, to exhibit an example of courage and fortitude to his officers and crew, and to place his ship opposite to his adversary, in such a situation, as that every cannon shall do effectual execution. At the time of his arrival in port, after his return from abroad, he is to assemble his officers, draw up a detail of the observations that have been made during the voyage, of the qualities of the ship, as to her trim, ballast, stowage, manner of sailing, for the information and direction of those who may succeed him in the command; and this account is to be signed by himself and officers, and to be returned to the resident commissioner of the navy at the port where the ship is discharged, and to transmit a duplicate of the same to the navy board.

The pay of captains in the royal navy was formerly very small; this defect was, however, made up by indulging them in many privileges not now allowed; as plundering of prizes, taking convoy-monies, and even carrying merchant goods, plate, &c. King James II. taking this last privilege away, in lieu thereof granted them an annual allowance of table-monies, almost equal to their whole former pay. But this not taking place, by reason of the abdication, king William III. in 1693, ordered the pay of captains to be doubled; but the fund for this failing at the peace of Ryfwick, a new establishment was made in 1700, whereby nearly one-third was retrenched from the sea-pay, and that of a first rate was fixed at 11. of a second rate at 16s. and a third rate at 13s. 6d. of a fourth rate at 10s. of a fifth rate at 8s. and of a sixth rate at 6s. per day.

Captains of post ships, after three years from the date of their first commission, rank as colonels in the army.

Admirals' ships, and those of the first rate, in the French navy, have two captains, two lieutenants, and two ensigns.

CAPTAIN, or more properly, *master*, of a merchant ship, is the person who has the direction of the ship, crew, and lading, &c. The proprietor of the vessel appoints the master, and the master engages his mate, crew, and pilots, &c.; though, when the proprietor and master reside in or near the same place, they generally act in concert together. In the Mediterranean the master is called the *patron*, or *patroon*.

CAPTAIN, a title in the royal navy, given to those persons who have the charge or command of a gun, of the tops, &c.

CAPTAINS of port, in the French *Marine Affairs*, officers established in some considerable sea-ports where there are arsenals. To them belong the command of the guard of the place, the watching of the sea, and the care and custody of the vessels brought into port.

There are such captains at Toulon, Rochfort, Brest, Havre, Dunkirk, and Port Lewis. They are to take care of mooring the king's ships, and oblige all to give the due salutes.

CAPTAIN's Clerk, a person employed by the captain to keep

keep his accounts, &c. His pay is the same as that of a midshipman. The captain is answerable for the faults of his clerk; nor can he receive his wages without proper certificates, and must make good all damages sustained by his neglect or irregularity. By a recent regulation, no person can be a purser unless he has served two years as captain's clerk.

CAPTAINRY, *capitainerie*, in the French *Law*, denotes the government or command of a royal palace, and the lands dependent thereon.

The name is also applied to the office of captains of chaces or woods: such are the captainries of Fontainebleau, the wood of Boulogne, &c.

CAPTIAUX, in *Geography*, a town of France, in the department of the Gironde, and chief place of a canton in the district of Bazas; 3 leagues S. of Bazas. The place contains 1152, and the canton 3015, inhabitants; the territory comprehends 362½ kilometres and 6 communes.

CAPTION, in *Law*, is that part of a legal instrument, as a "commission," "indictment," &c. which shews where, when, and by what authority, it is taken, found, or executed. Thus, when a commission is executed, the commissioners subscribe their names to a certificate, declaring when and where the commission was executed. The caption usually commences with these words, *Virtute istius commissionis nos*, &c. or, *Executio istius commissionis patet in quadam scheda annexata*, &c. or *Capt. & cogn. die*, &c. or *Capt. fuit hæc respons.* Captions of this kind relate chiefly to three sorts of business; to commissions to take fines of lands, to take answers in chancery, and depositions of witnesses.

These captions, and the executions of the commissions, must now be in English, by 4 Geo. II. cap. 26.

The word *Caption*, is also used, vulgarly, for an arrest.

CAPTION, in *Scots Law*, a writ issuing under his majesty's signet, in his majesty's name, obtained at the instance of a creditor in a civil debt, commanding messengers at arms, and other officers of the law, to apprehend and imprison the person of the debtor until he pay the debt.—Also, the name of a writ issued by the court of session against the agents of the court, to return papers belonging to processes or law-suits, or otherwise to go to prison.

CAPTIVE, a slave, or person taken by the enemy in war, or by a pirate or corsair. See **SLAVE**.

CAPTIVES, *captivi*, among the Romans, differed from *de-dititii*, as the former were taken by force, whereas the latter surrendered themselves.

By the *Lex Cornelia*, a Roman citizen taken captive, in case he returned, was reputed as having never been taken; if he died in captivity, he was reputed for dead the moment he was taken: in the former case he recovered all his right, and even the dominion over his children; in the latter his son became free from the time of his father's detention. Justin. Inst. lib. i. tit. xii. § 5.

Formerly captives in war became the slaves of those who took them; and though slavery, such as obtained among the ancients, be now abolished, some shadow of it still subsists in respect of prisoners of war, who are reputed the property of their captors, and have no right to liberty, but by concession from them, or till their ransom is paid. Negro servants likewise, who are purchased when captives, continue in some degree the property of the masters who buy them; though the property (if it indeed continues) consist rather in the perpetual service than in the body or person of the captive. Blackst. Com. vol. ii. p. 402. See **NEGRO** and **SLAVE**.

The Romans used their captives with great severity; their necks were exposed to the soldiers to be trampled on, and their persons afterwards sold by public auction. Captives

were frequently burnt in the funeral piles of the ancient warriors, as a sacrifice to the infernal gods. See **BURIAL**. Those of royal or noble blood had their heads shaven, and their hair sent to Rome, to serve as decorations in female toys, &c. They were led in triumph laden with chains through Rome, in the emperor's train, at least as far as the foot of the Capitoline mount, for they were not permitted to ascend the sacred hill, but carried thence to prison. Those of the prime quality were honoured with golden chains on their hands as well as feet, and golden collars on their necks. If they made their escape, or killed themselves to avoid the ignominy of being led in triumph, their images or effigies were frequently carried in their place.

CAPTIVITY is used in *Scripture* to denote the punishment inflicted by Providence on the Jews, for their idolatry and wickedness.

Their first captivity in Egypt, from which they were rescued by Moses, should be considered rather as the result of providential dispensation than as a penal evil. See **EXODUS**. The subsequent captivities of the Jewish people may be regarded as chastisements of Providence for their relapses into idolatry, and as means of reclaiming them to the acknowledgment and worship of the true God. The scripture history informs us of six captivities, which took place during the government by Judges. The *first* was that under Chusshian-Rishathaim, king of Mesopotamia, and continued eight years, from the year B. C. 1391 to 1383, when they were delivered by Othniel, the son of Kenaz, Caleb's younger brother. The *second* was that under Eglon, king of Moab, and lasted 18 years, viz. from the year B. C. 1343 to 1325. From this they were rescued by Ehud; and the eastern part of the country of Israel, after having been emancipated from the yoke of Moab, had rest 80 years. However, in the mean while, the Philistines invaded the western parts, and were repulsed by Shamgar. (Judg. iii. 31.) This is reckoned the *third* captivity. The *fourth* was that of the northern tribes by Jabin, king of Hazor, from which they were delivered by Deborah and Barak, in the year B. C. 1285; after which period the northern part of the territory of Israel had rest 40 years. (Judg. iv. 2. v. 31.) The *fifth* captivity, comprehending north and east Israel, was that under the Midianites, which lasted seven years, from the year B. C. 1245 to 1238; and from this the instrument of their deliverance was Gideon. (Judg. vi. 1, &c.) Their *sixth* captivity was that under the Ammonites and Philistines. While Jair was judge over north and east Israel (B. C. 1173), these districts were in bondage to the Ammonites 18 years (Judg. x. 8.); and at the same time with Jair, Eli began to judge south and west Israel 40 years, (1 Sam. iv. 18.), during which whole period that part of Israel was oppressed by the Philistines. (Judg. xiii. 1.) In the first of these 40 years of Eli, which was also the first year of Jair, Samson was probably born; and he lived 40 years, judging west Israel (while Eli also was judge there, and while that part of the country was under the Philistines) 20 years. (Judg. xv. 20.) North and east Israel were delivered from the Ammonites, after an oppression of 22, or 21 complete years, in the year B. C. 1152. (Judg. x. 3.) The oppression of the Philistines continued during the judicatures of Ibzan, Elon, Abdon, Eli, Samson, and Samuel. Ibzan presided over north and east Israel five or six complete years, from the year B. C. 1147 to 1140 (Judg. xii. 7.), when he was succeeded by Elon. About the fifth year of Elon (B. C. 1155), Samuel was publicly known to be a prophet. (1 Sam. iii. 20. iv. 1.) About the seventh of Elon (B. C. 1133), Samson pulled down the temple (Judg. xvi. 30.), and destroyed a great number of the Philistines. Usher thinks that this calamity might encourage

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the south and west Israelites to give them battle. (1 Sam. iv. 1.). Elon was succeeded in the judicature of north and east Israel by Abdon, B. C. 1130; and Abdon by Samuel, B. C. 1122, who was now judge over north and east Israel, as he had been before over south and west Israel. (1 Sam. vii. 15, 16, 17.)

However, the most signal captivities which these people experienced, were those of Israel and Judah, under the sovereignties of these kingdoms, after they were separated B. C. 975, denominated the *Affyrian* and *Babylonish*.

The *Affyrian* captivity, which comprehended that of the ten tribes, commenced in the reign of Pekah, king of Israel, B. C. 740, when Tiglath-Pilezer, king of Assyria, took several cities of Israel, and carried away captives, principally from the tribes of Reuben, Gad, and the half tribe of Manasseh. (1 Chron. v. 26. 2 Kings, xv. 29.). In the sixth year of Hezekiah, king of Judah, and ninth year of Hoshea, king of Israel, B. C. 721, Shalmaneser, king of Assyria, took and destroyed Samaria, after a siege of three years, transplanted those of the ten tribes, that had been spared by his father, Tiglath-Pilezer, to Nineveh, and provinces beyond the Euphrates, and thus dispersed them among the Gentiles. (2 Kings, xviii. 10, 11.). Moreover, in the 22d year of Manasseh, king of Judah, B. C. 676, Esharhaddon or Assaradus, king of Assyria and Babylon, made the last deportation of the Israelites, and planted others in their stead; and in the same expedition, probably, took Manasseh captive, and carried him to Babylon. (2 Kings, xvii. 24. 2 Chron. xxxiii. 11. Ezra, iv. 2.). The Assyrian captivity of the ten tribes of Israel, sometimes denominated Ephraim, from the chief of them, was predicted by Isaiah (see chap. vii. 8.) in the first year of Ahaz, king of Judah, B. C. 741. "Within three-score and five years," says the prophet, "shall Ephraim be broken, that it be not a people." This period has very much puzzled the scripture critics. If this prophecy was delivered in the first year of Ahaz, and Shalmaneser took Samaria, and carried away Israel (Ephraim) into Assyria, in the sixth year of Hezekiah, we shall only have an interval of 21, instead of 65 years. For the solution of this difficulty, the learned Vitringa supposes that the text is corrupted, and that instead of 60 (ששים) and 5, it was originally written 16 (שש) and 5. This conjecture would appear much more probable, if it could be proved, that it had ever been usual to write the numbers or dates of years partly in words at length, and partly in numeral letters. But it is not necessary to recur to this expedient. For if we compute, from the first of Ahaz, 65 years in the reigns of Ahaz, Hezekiah, and Manasseh, they will terminate about the 22d year of Manasseh, when the captivity of the Israelites was completed by Esharhaddon.

It has been generally supposed, that the greater part of the ten tribes was lost in this captivity, which put a period to the kingdom of Israel. It is certain, that immediately upon their deportation, they were placed in Assyria and Media; and if they subsisted any where, it is natural to imagine that they might be found there in the greatest number. But authors have generally sought for them elsewhere. Accordingly, the visionary writer of the second book of Esdras (xiii. 40, &c.) affirms, that they adopted a resolution of retiring from the Gentiles, and of emigrating into a country which had never been inhabited; that the Euphrates was miraculously divided for their passage; and that after pursuing their journey for a year and a half, they arrived at the country, Arfaxeth; a country the situation of which has not been duly ascertained. See *AFGHANS*. Benjamin Tudela, a Jew of the 12th century, has assigned them a large and spacious country, with fine cities, in a situation that

is altogether unknown. Eldad, another Jew, of the 13th century, has placed them in Ethiopia; and hath made the Saracens and 25 kingdoms tributary to them. Another Jewish writer, Peritsol of Ferrara, who lived in the 16th century, has allotted to them kingdoms in a country called Perricha, inclosed by unknown mountains, and bounded by Assyria, and likewise in the deserts of Arabia, and even in the East Indies. Manasseh, a famous rabbi of the 17th century, and others, have asserted, that they passed into Tartary, and expelled the Scythians; and others again from Tartary have conveyed them to America. Most of these accounts are unfounded conjectures, and some of them are manifest forgeries of the Jews to aggrandise their own nation. However, some respectable modern writers imagine, that they have found existing traces of them in the northern parts of India, particularly among the *AFGHANS*. The difficulty of ascertaining the habitations of the ten tribes, has induced others, among whom we may reckon Calmet, to maintain, that they returned into their own country, with the other two tribes, after the Babylonish captivity. To this purpose it is alleged, that their return was predicted. See Hosea, xi. 11. Amos, ix. 14. Obadiah, 18. 20. Isaiah, xi. 13, 14. Ezekiel, xxxvii. 16. Jerem. xxxi. 7, 8, 9, 16, 17, 20. xvi. 15. xlix. 2, &c. Zech. ix. 13. x. 6. 10. Micah, ii. 12. Besides, in the historical books of scripture, waving any reference to the apocryphal book of Tobit, Israelites, as well as those of Judah and Benjamin, are reported to have returned from the captivity. When Ezra numbered those that were returned from the captivity, he only inquired whether they were of the race of Israel; and at the first passover, then celebrated in the temple, there was a sacrifice of "12 he-goats for the whole house of Israel, according to the number of the tribes." Ezra, vi. 16, 17. viii. 35. Under the Maccabees, and in the time of our Saviour, Palestine was peopled with Israelites of all the tribes, without discrimination. However, as the decree of Cyrus extended to "all the people of God" (Ezra, i. 3.), and that of Artaxerxes to "all the people of Israel" (vii. 13), there can be no doubt that many of the Israelites availed themselves of these decrees, and returned with Zerubbabel and Ezra to their own cities; nevertheless, the main body of the ten tribes remained behind. Accordingly, Ezra, upon whose authority we may depend, informs us, that there "rose up the chief of the fathers of Judah and Benjamin" (ch. i. 5.), and he calls the Samaritans "the adversaries of Judah and Benjamin" (ch. iv. 1.); and hence we may infer, that these two tribes were the principals, and that the others were only accessories. And if they did not return at this time, they cannot be supposed to have returned, at least in a considerable body, at any future time; for history informs us of no such adventure, nor do we know either the time or occasion of their return, or who were their conductors in this expedition. Josephus, who saw his country for several years in as flourishing a condition as any time since the captivity, affirms (Antiq. lib. xi. cap. 5. §. 2.), that Ezra sent a copy of the decree of Artaxerxes to all of the same nation throughout Media, where the ten tribes lived in captivity, and many of them came with their effects to Babylon, desiring to return to Jerusalem; but the main body of the Israelites abode in that region; and therefore it hath happened, says this Jewish historian, that there are two tribes in Asia and Europe, living in subjection to the Romans; but the ten tribes are beyond the Euphrates to this time; and he then adds, with the vanity of a Jew, speaking of his countrymen, that they were so many myriads, that they could not be numbered. Others, who have found no sufficient authority for admitting that the ten tribes of Israel

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were restored in the same manner as the two tribes of Judah and Benjamin, have therefore asserted (see Prideaux's Conn. pt. 1. b. 1.) that the ten tribes of Israel, which had separated from the house of David, were brought to a full and utter destruction, and never after recovered themselves again. For those who were thus carried away (excepting only some few, who joining themselves to the Jews in the land of their captivity returned with them) soon falling into the usages and idolatry of the nations among whom they were planted, to which, indeed, they were too much addicted while they remained in their own land, after a while became wholly absorbed in them; and thence utterly losing their name, their language, and their memorial, were never after any more mentioned. To this statement, however, it has been very justly objected, that if the whole race of Israel became thus extinct, we shall in vain expect the fulfilment of the numerous prophecies, that promise the future conversion and restoration of Israel as well as of Judah. The truth, says bishop Newton (Dissertations on the Prophecies, apud Works, vol. vii. p. 195, &c. ed. 8vo.), seems to lie between these two opinions. "Neither did they all return to Jerusalem, neither did all, who remained behind, comply with the idolatry of the Gentiles, among whom they lived. But whether they remained, or whether they returned, this prophecy of Isaiah (ch. vii. 8.) was still fulfilled; the kingdom, the commonwealth, the state of Israel was utterly broken; they no longer subsisted as a distinct people from Judah; they no longer maintained a separate religion; they joined themselves to the Jews from whom they had been unhappily divided; they lost the name of Israel as a name of distinction, and were thenceforth all in common called Jews. It appears from the book of Esther, that there were great numbers of Jews in all the 127 provinces of the kingdom of Ahasuerus, or Artaxerxes Longimanus, king of Persia, and they could not all be the remains of the two tribes of Judah and Benjamin, who had refused to return to Jerusalem with their brethren; they must, many of them, have been the descendants of the ten tribes whom the kings of Assyria had carried away captive; but yet they are all spoken of as one and the same people, and all without distinction are denominated Jews." See also Acts, ii. 9. ch. xxvi. 7. James, i. 1. Without doubt, several persons of all the ten tribes are now in being, though we cannot distinguish them from the other Jews, with whom they are confounded and intermixed.

It appears, therefore, to be a fact, that the ten tribes of Israel were in a manner lost in their captivity, while the two tribes of Benjamin and Judah were restored and preserved several ages afterwards. Should an inquiry be made into the reason of this difference, it may be alleged, that the ten tribes had totally revolted from God to the worship of the golden calves in Dan and Bethel; and for this, and their other idolatry and wickedness, they were suffered to remain in the land of their captivity.

The *Babylonish* captivity comprehended that of the kingdom of Judah, or of the two tribes of Judah and Benjamin, who adhered to the house of David, and lasted 70 years.

The mode of estimating its duration has been attended with some difficulty, on account of the different captivities of the Jewish nation, which occurred about the same period. Of these there have been reckoned five. The *first* happened in the fourth year of Jehoiakim, B. C. 606, when Nebuchadnezzar, admitted to partnership with his father in the kingdom of Babylon, marched to Carchemish, with a great army, to recover from the king of Egypt all that he had lately conquered in Syria and Phœnicia. In the course of this expedition, he invaded and ravaged Judæa, besieged and took Jerusalem, made Jehoiakim his subject and tributary, transported the finest children of the royal family and of the

nobility, and among the rest Daniel and his companions, to Babylon, to be bred up there for eunuchs and slaves in his palace, and also carried away the vessels of the house of the Lord, and put them in the temple of his god at Babylon. (Dan. i. 1, 6.) The *second* captivity happened in the seventh year of Jehoiakim, B. C. 603, when Nebuchadnezzar, immediately after his father's death, returned to Judæa, made captives of many Jews, and bound their king in order to carry him to Babylon; though he restored him afterwards to his kingdom, having received the strongest assurances of subjection and allegiance. Notwithstanding these professions of obedience, Jehoiakim again rebelled, in the 11th year of his reign, B. C. 599. Nebuchadnezzar, hearing of this revolt, came against him with a prodigious army, and threatened all Judæa with destruction. Intimidated by this menace, Jehoiakim surrendered himself into the hands of his enemy, who slew him, together with many of the nobles, in Jerusalem, and placed his son upon the throne. (2 Chron. xxxvi. 6.) Afterwards repenting of what he had done, and fearing lest Jehoiachin should embrace some future occasion of revenging his father's death, Nebuchadnezzar returned within three months, carried that unfortunate prince into captivity, and appointed Zedekiah to reign in his stead. (2 Chron. xxxvi. 9. 2 Kings, xxiv. 18, &c.) This may be reckoned the *third* captivity of the Jews by the king of Babylon. On this occasion Mordecai and Ezekiel were among the captives. (Esth. ii. 5, 6. Ezek. i. 1, 2.) The *fourth* was in the 11th year of Zedekiah, 588 B. C., when the whole land was made desolate, when the city and temple of Jerusalem were destroyed, (the city being taken and burnt after a siege of 18 months, in the year B. C. 587, and the temple burnt in the year B. C. 586.) and when Zedekiah, king of Judah, was bound with fetters of brass, and carried prisoner to Babylon, where he died. (2 Kings, xxxv. 2, 9. 2 Chron. xxxvi. 10. Ezek. xii. 13.) The *fifth* captivity occurred in the 21st year of Nebuchadnezzar's reign, B. C. 584, when that monarch sent Nabuzaradan, captain of his guard, to revenge the death of Gedaliah, governor of Judæa. Nabuzaradan desolated the land, and carried to Babylon the wretched remains of that miserable nation.

To each of these captivities the date of the period of 70 years has been referred. But the first of them, in the fourth year of Jehoiakim, B. C. 606, seems to be the most accurate commencement of this period, and also the most agreeable to Scripture. The interval, extending thence to the second year of Cyrus, B. C. 536, when the Jews were permitted to return to their own land, amounts to 70 years; for Cyrus conquered Babylon towards the close of the year, B. C. 538; so that the year following, viz. 537, was the first year of his reign, and 536 the second, and the 71st from the fourth year of Jehoiakim. The date of the Babylonish captivity may be ascertained, says Playfair, (Chronol. p. 45.) by the following facts. Nebuchadnezzar became master of Tyre in the 34th year of his reign, the 26th of Jehoiakim's captivity, and 573 B. C. (572 B. C. Blair) as we learn from the Tyrian annals. (Joseph. cont. App. l. i. §. 21.) Cyrus took Babylon in the 14th year of Hiram, and 30th after it had been taken by Nebuchadnezzar, i. e. in the end of the year 538 B. C. In this instance, therefore, the Tyrian records confirm the sacred chronology.

The captivity and restoration of the two tribes were foretold; and moreover the precise time of both events was also prefixed and determined by the prophet Jeremiah, ch. xxv. 11. xxix. 10. This prophecy was first delivered (Jer. xxv. 1.) in the fourth year of Jehoiakim; and this same year Nebuchadnezzar began to put it in execution. If the

commencement of the 70 years' captivity be fixed at the time when Jerusalem was burnt and destroyed, their conclusion will fall about the time when Darius, the son of Hystaspes, issued his decree for rebuilding the temple, after the work had been suspended, which was in the fourth year of his reign and B. C. 518. Or again if we fix their commencement at the time when Nabuzaradan carried away the last remnant of the people, and completed the desolation of the land, their conclusion will fall about the time when the temple was finished and dedicated, and the first passover solemnised in it, which was the seventh year of Darius and the 515th B. C. Hence Dr. Prideaux observes (Conn. part 1. book 3.), "that taking it which way you will, and at what stage you please, the prophecy of Jeremiah will be fully and exactly accomplished concerning this matter." Or, it may be said to have been accomplished, as bishop Newton observes (vol. vii. p. 187.), at three different times, and in three different manners, and therefore possibly all might have been intended, though the first was without doubt the principal object of the prophecy. The prophets Isaiah (xliv. 28.) and Ezekiel (xxxvi. 10, &c.) have previously drawn lively pictures of the happy days that should succeed the captivity, which were actually realized; for the people returning to their own country, enjoyed the blessings of liberty and affluence. The people were multiplied, their cities were inhabited, and their wastes were cultivated. Whilst the 10 tribes were dispersed and lost, those of Benjamin and Judah, or the Jews, were restored, not so much for their own sakes, as for the sake of the promises made unto the fathers, the promise to Judah that the Messiah should spring from his tribe, and the promise made to David that the Messiah should be born of his family. It was therefore necessary for the tribe of Judah, and the families of that tribe, to be kept distinct until the coming of the Messiah. But since these ends have been fully answered, the tribes of Judah and Benjamin are as much confounded as any of the rest; all distinction of families and genealogies is lost among them, and the Jews themselves acknowledge as much, when they say, that when the Messiah shall come, it will be part of his office "to sort their families, restore their genealogies, and set aside strangers."

The captivity, considered as a dispensation of providence, will appear to have been highly necessary and proper, if we reflect, that the lenity of God was manifest in bringing this terrible overthrow on the Jews so gradually, after a succession of judgments from less to greater for the space of 22 years, which should have been a warning to them, and by experience have convinced them, that the threatenings denounced by the prophets would certainly be executed:—that it was a just punishment of their sins, particularly of their idolatry:—that it was the most effectual means to produce their reformation, the great end proposed by divine wisdom; and indeed it had this effect, in a very considerable degree, for they never more fell into idolatry, but retain the greatest abhorrence of it even to this day:—that they had so far neglected the law of God, written by Moses, as the rule of their conduct in all affairs civil and religious, and the ground of their happiness, that at one time it was almost unknown and lost among them (2 Kings, xxii. 8, 12.):—and that this dispensation was also calculated to produce beneficial effects among the nations, whither they were carried into captivity. The Jews, notwithstanding their depravity in their own country, during the captivity of 70 years, must have been a burning and shining light, all over the countries of the east.

Besides the captivities already enumerated, there happened another considerable captivity and dispersion of the Jews

in the time of Ptolemy, the son of Lagus, usually called Soter, about the year B. C. 319; who invaded Judæa, besieged and took Jerusalem, and carried above 100,000 of the inhabitants captives into Egypt, planting them in Alexandria and adjacent places. Ptolemy, though at first he treated Jerusalem and Judæa with great severity, considering afterwards the steadiness with which they had persisted in the fidelity they had sworn to their governors, on this and a variety of other occasions, and convinced that this quality rendered them worthy of his confidence, chose 30,000 of the most distinguished among them and of such as were most capable of serving him, and appointed them to guard the most important places in his dominions. Many of the Jews followed their captive brethren of their own accord, partly allured by the favour of the king, who gave them equal privileges with those of Alexandria, and partly by the fertility of the country, so that this colony, from which sprung the HELLENISTS, became very considerable. The last captivity of the Jews was that which happened in consequence of the destruction of their city and temple under Titus about 40 years after our Saviour's ascension. See JERUSALEM.

CAPTIVITY, *princes of the*, are heads or chiefs of the Jewish nation, appointed for the administration of justice among them, during their captivity both in the east and west, since the destruction of their temple by the Romans. The prince of the captivity in the east, is said to have had the government of the Jews who dwelt in Babylon, Chaldæa, Assyria, and Persia. The prince of the captivity in the west, had the direction of those who lived in Judæa, Egypt, Italy, and other parts of the Roman empire. The Jews make a great difference between the patriarchs of Judæa, and the princes of the captivity at Babylon. The latter were called "rabbans," and were supposed to have descended from David, in a direct line by the males; the former or patriarchs, called "rabbau," only descended from David by the females. The patriarch, who resided in Judæa, made Tiberias the place of his customary abode, and assumed the title of "Roschabboth," i. e. the head of the fathers or patriarchs. He presided in assemblies, decided in cases of conscience, levied taxes for defraying the charges of his visits, and dispatched subordinate officers through the provinces to execute his orders. As to the princes of the captivity of Babylon, or the east, their origin and succession are unknown; but it does not appear that they sprung up till about the end of the second century. While the temple subsisted, the eastern Jews, as well as western, continued subject to the high priest. The first of these princes is said to have been Huna, at the close of the second century; and from Huna to the perfection of the talmud, i. e. 300 years, they scarcely produced three. Calmet. See *ÆCHMALOTARCHA*.

CAPTURE, a prize, or prey; particularly that of a ship taken at sea. Captures made at sea were formerly held to be the property of the captors after a possession of twenty-four hours; but the modern authorities require, that before the property can be changed, the goods must have been brought into port, and have continued a night *intra præsidia*, in a place of safe custody, so that all hope of recovering them was lost. Blackst. Com. vol. ii. p. 401. See **PRIZE** and **PRIVATEER**.

CAPTURE also denotes an arrest, or seizure of a criminal, debtor, &c. at land.

CAPTURE, *de Deserteurs*. There existed under the old government of France an order, by which every intendant of a province or commissary of war was authorised to pay 100 livres to any person or persons, who should apprehend or secure a deserter, and 300 livres for every man, that could

could be proved to have enticed a soldier away from either the regular army or the militia.

CAPUA, in *Ancient Geography*, a city of Italy, the metropolis of Campania, derives its name, according to Strabo, from *caput*, head. It was situated at some distance to the north of Neapolis, near the mountains; and it was the chief and most important city of Magna Græcia. According to Florus, it was one of the three most celebrated cities known to the ancients, who placed it next to Rome and Carthage.

"Altera dicta olim Carthago, atque altera Roma,

Nunc prostrata jacet, proprioque sepulta sepulchro."

It is said to have been founded by the Tyrrhenians, who had extended their power into Magna Græcia, about 48 years before the foundation of Rome, or 800 years before the Christian æra. When the Samnites made themselves masters of the country, Capua fell into their hands, and Livy seeks the etymology of its name in that of their chief, called "Capys." The astonishing fertility of the adjacent country, and a lucrative commerce, poured, at an early period, immense wealth upon its inhabitants, so that it became one of the most extensive and magnificent cities in the world. Riches produced excessive luxury and insolence, in both which respects, Capua is particularly noticed by ancient writers. The luxury of Capua is said even to have surpassed that of Sybaris itself. See Athenæus *Deipnosophist.* l. xii. p. 528. ed. Casaubon. By its insolence it exasperated neighbouring nations, which, on account of its effeminacy, it was not able to repel; and therefore it was reduced to the necessity of endangering its own safety by engaging the succour of needy auxiliaries. The Roman soldiers who were sent to the defence of Capua, were on the point of making it their prey; and the voice of the Roman people often loudly expressed their wish for a removal from the barren unwholesome banks of the Tiber, to the garden of Italy, near those of the Volturno. Jealous, and not without reason, of the ambition of Rome, or naturally inconstant, as Livy and some other writers suggest, the Capuans warmly espoused the quarrel of Carthage: and Hannibal, after the battle of Cannæ, made Capua his winter-quarters. In this scene of luxury and dissipation, if we may credit Livy and some other historians, the rough and invincible soldiers of the Carthaginian general were metamorphosed by pleasure and indolence into soft minions, never afterwards fit to cope with the Romans in the field. Hence, it became a proverb, "Capuam Hannibali Cannas fuisse;" i. e. Capua was to Hannibal what Cannæ had been to the Romans. The judicious Montaigne observes, that the Carthaginian army, enriched by so many victories, would have found a Capua wherever they had gone. The pernicious effects of idleness and luxury are unquestionable; but the frequent defeats which Hannibal afterwards gave to the Romans, the several towns which he reduced in the fight of the Roman armies, and the bravery with which he maintained himself in Italy for 13 years, after the winter spent at Capua, constrain us to ascribe some degree of rhetorical exaggeration to the accounts of the Roman historians. Indeed, Livy himself points out a cause of the declension of the Carthaginian power in Italy, which is very different from the delights and debaucheries of Capua. Hannibal, disappointed of promised succour by a domestic faction, and deserted by the Gauls and Italians, who were not natural allies of the Carthaginians, was under the necessity of withdrawing from the scene of contest, and of yielding to a superior force, which drove him from Italy. Liv. l. xxiii. c. 13 and 32. l. xxvi. Whether Capua brought on the ruin of Hannibal or not, Hannibal, without doubt, occasioned the ruin of Capua. After the departure of the

Carthaginians, Capua, which had been long invested, surrendered at discretion to the consuls Appius Claudius, and Q. Fulvius Flaccus, in the year of Rome 542. On this occasion, 30 senators were scourged and put to death; the nobles imprisoned for life, and the citizens sold and dispersed. Vibius, Hannibal's principal friend, escaped this ignominious fate by a voluntary death; for whilst the mob insisted upon throwing open the gates to the enemy, he assembled his steady associates, and sat down with them to a superb banquet; after which, each of the guests swallowed a poisonous draught, and expired in full possession of their freedom. Although the buildings were left undemolished, Capua was consigned to be the lodging place for the husbandmen of the adjoining plain, a warehouse for goods, and a granary for corn. However, in process of time, about 152 years after this event, Cæsar sent thither colonies, and restored it to its ancient privileges. Cicero appears to have been the patron of this new city, and to have had in charge the inspection of the sea-coast from Formiæ, A. U. C. 704, B. C. 50. In this command of Capua he calls himself the "episcopos" of the Campanian coast, and he also mentions when proconsul of Cilicia, the "dioceses" that were annexed to his government; and hence it is inferred, that these names, which were afterwards appropriated in the Christian church to characters and powers ecclesiastical, carried with them in their original use, the notion of a real authority and jurisdiction. See *Diocese*. As Capua had been always the common seminary, or place of educating gladiators for the great men of Rome, Cæsar had a famous school of them, at the time when Cicero had the command of it. This school he had maintained under the best masters for the occasions of his public shows in the city; and as they were very numerous, and well furnished with arms, there was reason to apprehend they would break out, and make some attempt in favour of their master, which might have been of dangerous consequence in the then existing circumstances of the republic; and, therefore, Pompey thought it necessary to take them out of their school, and distribute them among the principal inhabitants of the place, assigning two to each master of a family, by which he secured them from doing any mischief. Cic. ad. Attic. 7. 14.

Tiberius, A. D. 26, dedicated in this place a temple to Jupiter; and in the reign of Nero, A. D. 57, the colonies of Capua, and also of Nocera, which were almost extinct, were revived and strengthened by a number of old soldiers, sent thither with the same prerogatives as the ancient inhabitants. When the cities of Campania were divided between Vitellius and Vespasian, Capua maintained its attachment to the former, and in consequence of this preference, the third legion was quartered there for the winter, and the most illustrious families were treated with ignominy. At length, Genseric the Vandal, in the times of the Lombards, was more cruel than the Roman conquerors had been; for he massacred the inhabitants, and burnt the town to the ground. Narjes rebuilt it; but in 841 it was totally destroyed by an army of Saracens, and the inhabitants were driven into the mountains. Some time after the retreat of these savage invaders, the Lombards descended again into the plain, but apprehending their force not to be sufficient for the defence of a circuit so extended as the old city, they built a smaller one on the river Volturno, choosing for its site that of Cassinum, which had distinguished itself in the second Punic war by the resistance of its garrison against Hannibal, and calling it by the old name of Capua. Since the foundation of the new city, old Capua, distant from it about two miles, has remained in ruins, occupying a considerable extent of ground. Of these, the most worthy of notice is the amphitheatre, which, though

in a degraded and desolate state, indicates its former grandeur. Two small villages now occupy part of the spacious inclosure of this city, which was the centre from whence the via Appia, via Latina, via Domitia, and others, branched off towards different provinces of Italy. Along the edges of these roads the ancients buried their dead in magnificent mausolea, some few of which are yet standing, and point out the direction of the highways. The "conocchia," a vulgar name given to one of these monuments, from a supposed resemblance to a distaff, is the handsomest, and consists of a cupola, surrounded with columns placed upon a square tower.

In 856, Landolph formed at Capua an independent earldom, dismembered from the duchy of Benevento; and in the course of a few generations, it acquired the title of a principality. In the 11th century, the Normans of Averla expelled the Lombard race of princes, and Richard their chief became prince of Capua. The grandson of Tancred of Hauteville drove out the descendants of Richard, and united this state to the rest of his possessions.

Capua is at present a neat little city of Naples, in the country of Lavoura, seated at the foot of a mountain, the see of an archbishop, founded in 968. It contains, beside the cathedral, one collegiate, 16 parish churches, and 12 convents. It may be considered as the key of the kingdom; for though far removed from the frontier, it is the only fortification that really covers the approach to Naples, from which it is distant about 15 miles. The streets are more open and airy than those of other towns in this kingdom, and the buildings better. Many of them are constructed with materials brought from the ancient city. N. lat. $41^{\circ} 7'$. E. long. $15^{\circ} 5'$.

CAPUCHE. See COWL, and next article.

CAPUCHINS, religious of the order of St. Francis, in its strictest observance. The capuchins are thus called, from *capuce*, or *capuchon*, a *stuffed cap*, or *cowl*, wherewith they cover their heads; and which they added to the ordinary Franciscan habit. They are clothed with brown or grey; are always bare-footed; and never go in a coach, nor ever shave the head.

The Capuchins are a reform made from the order of Minors, commonly called *Cordeliers*, set on foot in the sixteenth century by Matthew de Bassi, a religious observant of the monastery of Montefiascone, who, being at Rome, said he was advertised several times from heaven, to practise the rule of St. Francis to the letter. Upon this he made application to pope Clement in 1525, who gave him permission to retire into a solitude; together with as many others as would embrace the strict observance; which some did accordingly. In 1528, they obtained the pope's bull. In 1529, the order was brought into complete form; Matthew was elected general, and the chapter made constitutions. In 1543, the right of preaching was taken from the Capuchins by the pope; but in 1545, it was restored to them again with honour. In 1578, there were seventeen general chapters in the order of Capuchins.

The Capuchins were at first restrained from spreading out of Italy; but Charles IX. of France, writing to pope Gregory XIII. to demand some Capuchins, that pope, by a bull, dated in 1575, took off the prohibition, and granted them leave to settle any where. The cardinal of Lorraine built them a convent at Meudon, and Henry III. another at Paris, in the rue St. Honoré. F. Zach. de Boverio has written the annals of the Capuchins in Latin, in three volumes folio, from the year 1524 to 1634.

CAPUCHIN, in *Ornithology*, the name of a particular species of pigeon, in shape and make much like the jacobine,

or jack, but something larger than that; its beak also is longer; and it has a tolerable hood of feathers on the back part of its head, but has no cravat or chain down the shoulders as that species has. Its marks are the same with the jacobine, and it seems to be no other than a bastard breed between that and a common pigeon.

CAPUCHIN Monkey, in *Zoology*. See CAPUCINA SIMIA.

CAPUCHIN Powder, in the *Materia Medica*. See CERVILLA, SABADILLA, and VERATRUM.

CAPUCIATI, in *Ecclesiastical History*. an appellation given to the followers of Wickliff in the fourteenth century, by reason they did not uncover themselves before the host, but kept on their *capuce*, or cap used in those times. Spondanus speaks of the capuciati, under the year 1387.

CAPUCIATI. See CAPUTIATI.

CAPUCINA, in *Entomology*, a species of PHALÆNA, (Bombyx) that inhabits Europe. The wings are dentated and ferruginous, with a dorsal reflected tuft.

CAPUCINA, in *Zoology*, a species of SIMIA, of the long-tailed, or sapajou tribe, called by Pennant the *Capucin monkey*. This kind is distinguished by having no beard, the tail hirsute, (and prehensile); hair and limbs black; haunches covered, or without callosities. Simia imberbis nigra, cauda longa hirsuta, facie flavescens. Linn.

There are three kinds of monkey, simia trepida, appella, and capucina, that are nearly allied to each other: some consider the two last as varieties of the same species; Schreber makes them distinct.

Gmelin describes this animal as being about the size of the domestic cat: the general colour brown, with the head, legs, and tail black; face sometimes black, sometimes flesh-coloured; tusks approximate; nose carinated near the eyes; a black retractile wrinkle just under the hair of the forehead; tail long, curved, and shaggy, with hair, which it carries spirally rolled up, and often coiled round the neck. In the Leverian Museum is a specimen of this animal agreeing with the description given of the species by Mr. Pennant and Dr. Shaw. The face is round, flat, and flesh-coloured; encircled with upright whitish hairs; the breast covered with long shaggy yellowish white hairs; top of the head blackish; hair on the shoulders and upper part of the back lighter than on the lower part; tail as in the former species; toes with crooked claws instead of flat nails.

Simia capucina is said to be a native of South America. The animal smells musky, has a wailing voice, sometimes shrieks like the cicada, or when irritated yelps like a whelp, and terrifies or repels its enemies by hideous howlings.

CAPUCINUS, in *Conchology*, the name by which Rumpius distinguishes *conus monachus* of Linnæus.

CAPUCINUS, in *Entomology*, a species of BOSTRICHUS in the Fabrician system, (*Dermestes*, Linn. and *Bostrichus*, Geoffr.) The colour of this insect is black, with red abdomen and wing-cases; and retuse thorax. Inhabits Europe.

Obs. Lepechin describes a variety of this insect with a black abdomen. This is found in Siberia.

CAPUCINUS, the name given by Walch to the Linnæan butterfly, PAPILIO IPHICIA, which see.

CAPUL, in *Geography*. See CAPOUL.

CAPURA, in *Botany*, Linn. Mant. 225. Schreb. 599. Willd. 683. Juss. 437. Class and order, *hexandria monogynia*.

Gen. Ch. Cal. none. Cor. monopetalous, tubular; tube cylindrical; border with six roundish divisions, the outer alternate ones narrower. Stam. Filaments scarcely any; anthers six, oblong, within the tube; the alternate ones higher. Pist. Germ superior, triangularly roundish, truncate; style cylindrical, very short; stigma nearly globular. Peric. Berry? La

La Marck thinks it has some affinity to the genus *Dais*.

Eff. Ch. *Calyx* none. *Corolla* six-cleft. *Stamens* within the tube. *Stigma* nearly globular.

Sp. *C. purpurata*. A tree. *Branches* alternately in pairs at right angles with each other, purplish. *Leaves* deciduous, opposite, egg-shaped, resembling those of *lonicera xylosteum*, entire, rather acute, on very short petioles. *Flowers* in axillary clusters, purple, shorter than the leaves. A native of the East Indies.

CAPURSO, in *Geography*, a town of Naples, in the country of Bari; $3\frac{1}{2}$ miles S.E. of Bari.

CAPUT. See HEAD.

CAPUT, in the *University of Cambridge*. See CAMBRIDGE.

CAPUT *Baronia*, the head of the barony, in *Ancient Customs*, denotes the ancient or chief feat or castle of a nobleman, where he made his usual residence, and held his court: sometimes also called *caput honoris*, or the head of the honour.

The *caput baronia* could not be settled in dowry; nor could it be divided among the daughters in case there were no son to inherit; but was to descend entire to the eldest daughter, *ceteris filiabus aliunde satisfactis*.

CAPUT *Coli*, in *Anatomy*, the commencement of the large intestine, which is also called the cæcum. See INTES-TINE.

CAPUT *Draconis*, a denomination given by some to a fixed star of the first magnitude, in the head of the constellation draco, called also by the Arabs *rafaben* and *eltanin*. See NODE.

CAPUT *Gallinaceum*, in *Botany*, Lob. Ic. ii. p. 81. See HEDYSARUM *onobrychis*.

CAPUT *Gallinaginis*, or *Verumontanum*, in *Anatomy*, a small production of the prostate gland, projecting into the lower part of the urethra, where that canal penetrates the prostate, and having on its surface the openings of the ducts, formed by the union of the vasa deferentia, and vesiculæ seminales. See GENERATION, *Organs of*.

CAPUT *Fejunii*, a name given to Ash-Wednesday, as being the first day of the Lent-fast.

CAPUT *Lupinum*. An outlawed felon was anciently said to have *caput lupinum*, and might be knocked on the head like a wolf, because, having renounced all law, he was to be dealt with as in a state of nature, when every one that should find him might slay him: but now the wilful killing of such a one is murder, unless in the endeavour to apprehend him.

CAPUT *Medusæ*, in *Astronomy*, a northern constellation included in that of PERSEUS.

CAPUT *Medusæ*, in *Botany*, Morif. Hist. iii. p. 210. See ELYMUS *Caput medusæ*. See also EUPHORBIA *Caput medusæ*.

CAPUT *Mortuum*.—*Tête morte*, Fr. *Todtenkopfe*, Germ. This term is at present obsolete. It was used by the old chemists to express the residues of distillations after all the volatile parts had been driven off by the action of heat. These residues were at first thrown away as of no value. Glauber was the first who particularly employed himself in their examination, and was rewarded for his pains by the discovery of the salt that bears his name, (sulphat of soda), in the caput mortuum remaining after the distillation of muriatic acid from common salt and green vitriol; and of sulphat of potash in the residue after the distillation of nitric acid from nitre and sulphat of iron.

CAPUT *Pancreatis*, in *Anatomy*, that portion of the pancreas, which is attached to the duodenum. See PANCREAS.

CAPUT *Porcinum*, *swine's head*, a denomination given by the Romans to an order of battle more frequently called *cuneus*.

CAPUT *Purgia*, a barbarous term used by some physicians to denote medicines which cleanse the head, either in the way of sneezing, more frequently called *errhines*; or by chewing in the way of salivation, called *apophlegmatizants*. See ERRHINA and STERNUTATIVE.

CAPUT *serpentis*, in *Conchology*, a species of ANOMIA, the shell of which is obovate, striated, and downy; one valve with a long perforated beak. Linn. Fn. Suec.

Inhabits the deeps of the Norway seas, and is generally found adhering to the *madrepora prolifera*. Shell white, longitudinally striated. Upper valve prominent behind, declining at the anterior part, and marked with a groove in the middle; lower valve rounded, and retuse before.

CAPUTA, in *Ancient Geography*, a town of Armenia Minor. Ptolemy.

CAPUTIATI, or CAPUCIATI, in *Ecclesiastical History*, a sect of fanatics, so called from a singular kind of cap that was the badge of their faction, which infested the province of Burgundy, the diocese of Auxerre, and several other parts of France, towards the close of the 12th century, and excited much disturbance among the people. They wore upon their caps a leaden image of the Virgin Mary, and they publicly declared that it was their purpose to level all distinctions, to abrogate magistracy, to remove all subordination among mankind, and to restore that primitive liberty and natural equality that were the inestimable privileges of the first mortals. They were attacked with the force of arms by Hugo, bishop of Auxerre. Mosh. Eccl. Hist. vol. iii. p. 128.

CAPUTUADE, in *Geography*, a port of Africa, in Byzacium, where the Roman fleet landed the troops that made war against Gelimer; distant, according to Procopius, five days' journey from Carthage. Justinian, he adds, built a town in this place inclosed by strong walls.

CAPYÆ, in *Ancient Geography*, a town of the Peloponnesus, in Arcadia, near Mantinea, according to Dion. Hal. and Strabo, who supposed it to have been built by Ænæas.

CAPYBARA, or CABYBARA, in *Zoology*, the American name of a species of CAVIA, found in that part of the world, and called by English writers the *water cavy*, or *river cavy*. It is distinguished by having no tail, and the fore-feet three-toed, and palmated. See CAVIA.

CAPYS, in *Entomology*, a species of SPHINX, (*Zygæna*) of a black colour, with the tip of the anterior pair white. Fabr.—Inhabits Surinam.

CAPYTIUM, in *Ancient Geography*, a town of Sicily. Ptolemy.

CAR. See CARR.

CAR, or KAR, signifies in the oriental languages a *town*; and of course enters into the composition of the names of several places.

CAR, or CAM LOUGH, in *Geography*, a small lake in the county of Armagh, Ireland, at the foot of Slieve Gullien mountain, from which a narrow and rapid stream flows for a course of about four miles, when its waters contribute to the supply of Newry canal. This lake, river, and a small village, all of the same name, are mentioned on account of the great business done on the banks of the stream. So elevated is the source of it, that there are a great number of scites of mills, all of which are overshot. So sudden, indeed, are the falls, that no head of water is required as a mill-pond for any of the works, the tail-race of the higher mill being the head of the next below, and so in succession until

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it reaches the valley. In the space of within two miles, there are four extensive bleach-grounds, three of which can finish 50,000 webs in a year; a very large boulding-mill, beside two other flour-mills; a flax-mill, and some other manufactories about to be established. These numerous works furnish an eminent instance of the superior spirit and industry of the people in this part of Ireland, who so eagerly seize every natural advantage for furthering and increasing their trade. Coote's Armagh.

CARA, in *Botany*, Francis. Gart. tab. 25. fig. 8. See *Dioscorea aculeata*.

CARA, in *Geography*, a river of European Russia, which directs its course towards the Arctic Ocean, and forms the boundary between Asia and Europe, for the space of about 140 miles; the Arabian chain terminating so far from the sea of Carakoi, or Karakoi.

CARABA, or CRAB-tree, in *Botany*, attains in Guiana the height of 40 feet, and consists of numerous branches, covered with long, narrow leaves of a green colour. Its numerous white blossoms are succeeded by nuts about the size of a large chestnut, the form of which is angular and flattish; within the thin, brown, husky shell is contained a white oleaginous kernel. From these kernels the Indians extract, by bruising, macerating, and boiling, a yellowish, bitter, butyraceous oil, with which they constantly grease and rub their naked skins: thus defending themselves from musketoes, softening their skins, and preserving them from taking cold by dews, rain, &c. Bancroft's Guiana, p. 81.

CARABAYA, or CARAVAYA, in *Geography*, a district or jurisdiction of South America, in the diocese of Cuzco, and vice-royalty of Buenos Ayres, commencing 60 leagues S.E. of Cuzco, and extending above 50 leagues. The greater part of it is cold; but the vallies are fertile, producing various sorts of fruits, grain, and pulse, and affording sufficient pasture for cattle of all kinds. This province has several gold mines, particularly that called "Aporama," which is very rich and the metal 23 carats fine, and also silver mines, which produce vast quantities of that metal. The river which separates this province from the mountains of the wild Indians abounds so much in gold, that at certain times the Caziques send out a certain number of Indians in companies from the towns in their respective districts, to the banks of the river, where, by washing the sands in small wells dug for that purpose, they soon find sufficient quantity of gold to pay the royal tribute. This kind of service they call "Chichina."

CARABE, or KARABE, denotes yellow AMBER.

CARABIA, in *Ancient Geography*, a town of Macedonia, placed by Ptolemy in Mygdonia.

CARABIN, or CARBINE, in French *Canon carabiné*, is a fire-arm about a tenth of an inch smaller in the bore than a musket, and about five inches shorter, having its barrel about three feet one inch long, and its whole length, including the stock, about four feet one inch. Carabines, or canons carabiné, have the outside of their canons or barrels of the same figure and form with those of common muskets. But they are generally, or at least often rifled on the inside, having longitudinal grooves sometimes straight, but much oftener circular or spiral, running the whole length of the bore. When grooved, they are generally fired with leaden bullets, that are rammed down along the grooves with iron rammers or ram-rods, which ramming, together with the force and velocity with which they are driven back along the same grooves by the inflated powder, considerably alters their shape and figure. The common observation, however, that a ball so rammed down and fired from such a piece goes

farther than one of the metal that has windage, in consequence of its being long enough in the barrel for the complete inflammation of the charge of powder, is founded in mistake. The grooves, when they are made winding, give the ball a sort of rotatory motion round its axis in the direction of its flight, that prevents its deflection from the path of its projection.

CARABINEER, or CARBINEER, in French *Carabinier*, was a soldier chosen from among the best and most expert shooters, who served sometimes on foot, but generally on horseback, and carried a carabine longer than the ordinary fusée, and commonly rifled. No corps in the French service has distinguished itself more than the carabineers. They immortalized themselves at the battle of Fontenoy. Any deficiencies in it, either in men or officers, were filled up from the regiments of French cavalry, according to their seniority. As to the time of raising it, or its seniority of creation, it would have been the twelfth regiment in that service; but in consequence of some other regiments having the name of Royal, and therefore standing before them, it only occupies the twenty-second rank or place.

Formerly, all regiments of light armed horse were called carabineers. But, since the establishment of hussars and chasseurs, they have lost that appellation. And now all the heavy foreign cavalry are denominated carabineers.

CARABINS, otherwise called *Argoulets*, were a species of hussars in the ancient French militia, and sometimes acted on foot. There were chosen and resolute men. All the principal officers of the army used to have them as their guards. And they were often stationed at the outposts for the purpose of harassing the enemy, guarding narrow passes, &c. In action they generally engaged in front of the dragoons, or on the wings of the first line. The term comes from the Arabian word *Karab*, which signifies generally a war-like instrument of any kind.

CARABON, in *Botany*. Lam. Encyc. (Kari-bepon: Rheed. Mal. 4. p. 109. tab. 53. *Olea malabarica* Nimbo dicta, fructu racemoso rotundo: Rai. hist. 1545.) Cal. small, with five acute divisions. Cor. Petals five, lanceolate. Stam. Filaments ten, the length of the petals. Pist. germ superior: style small, whitish: stigma headed, greenish. Peric. Berry round, with one seed. A large ever-green tree. Branches reddish, woolly. Leaves winged, with a disagreeable smell and a sourish bitter taste. Flowers in terminal panicles, small, whitish, with a strong smell. An oil is expressed from the fruit. A native of Malabar, where it bears flowers and fruit twice in the year. Allied to *Melia* and *Muraya*.

CARABUS, in *Entomology*, a genus of Coleopterous insects that have the antennæ filiform: thorax somewhat heart-shaped, truncated behind, and with the wing-cases margined.—This is the essential character of the genus carabus, but which is distinguished further by having six feelers, each of which has the last joint obtuse, and truncated: the abdomen ovate; and the posterior thighs furnished with an appendage at the base. The mouth is also small, the lip, in some entire and truncated as in the true Fabrician carabi: dentated as in his *scarites*, or trisid, as in his *manticora*, all which belong to the Linnæan carabi, except a few of the Scarites that are Tenebriones of that author. The legs of the carabi are also long, the thighs compressed, shanks round and ciliated within, the anterior part spinous before the tips, and the tarsi of all the legs composed of five joints.

Olivier divides the Linnæan Carabi into a variety of new genera, as cychrus, calosome, galerite, brachinus, anthie, manticore, scarite, lesteve, and odacanthie. An arrangement somewhat similar to this appears in the different systems

tems proposed by Fabricius, but not the same, and further alterations still have been adopted by other French authors besides Olivier. We think the carabi may, notwithstanding, be extremely well distinguished by adhering much nearer to the example of Linnæus; the manticora and scarites we should ourselves separate as distinct genera from the carabus, but it is impossible to conceive the necessity of rending the Linnæan genus into so many parts as Olivier has to form so many new genera:—improvement, and not innovation, should be the leading object of naturalists when they presume to deviate from the authority of their predecessors. That the Linnæan carabi, even if we abide by the Linnæan method, should be separated into distinct tribes, is sufficiently apparent to every entomologist; we only mean to maintain that by thus dividing them into tribes, they may with few exceptions be retained under one general title with more convenience, and more propriety, than under such a number of different genera as the French writers are inclined to make of them. Fabricius even seems aware of this, for although he forms new genera of part of the Linnæan carabi, his own genus carabus is divided into four distinct sections: * *Thorace cordato*.—** *Thorace postice angustato*.—*** *Thorace quadrato*.—**** *Thorace rotundato marginem prominulo obtuso*. Mr. Marshall, in his recently published work, *Entomologia Britannica*, has also shewn that it is far better to subdivide the Linnæan carabi into sections than to constitute new genera; the species of carabus found in England, which are those that chiefly demanded his attention, he divides into six sections, in the following manner. 1. *Thorace postice angulato*.—2. *Thorace postice truncato integro, elytris æquali*.—3. *Thorace postice truncato integro, elytris angustiori*.—4. *Thorace postice truncato integro elytris angustiori, sub-elongato, attenuato*.—5. *Thorace postice rotundato*.—6. *Thorace remoto*. Gmelin divides the carabus genus into only two parts, distinguishing the insects according to their size, *maiores* and *minores*, in the last edition of the Linnæan *Systema Naturæ*. Turton, in his translation of that work, entirely deviates from his author; he adopts the Fabrician subdivisions, and this is certainly an improvement, but it should have been mentioned as such. The following arrangement of the numerous species of this genus will be found to correspond as nearly with the Linnæan and Fabrician authorities as the latest observations and discoveries of authors will conveniently admit.

Many of the insects of this genus possess the same habits of life. Their larvæ live in the earth, under stones, or in decayed wood, and are for the most part unknown. In the last or perfect state a number of the species are destitute of wings, but they are remarkably active, and run swiftly. Some kinds avoiding the light appear only in the night time, while others ramble about in the middle of the day, and seem to be most vigorous when the sun shines intensely hot, at which time numbers of them may be seen running in pathways, and sandy places. If these insects are closely pursued, they emit a strong, and highly fetid odour, and when caught immediately eject both from the mouth and vent, a dusky greenish, or in some species, a reddish liquor of an extremely acrid and caustic nature, the smell of which is similar, but rather more powerful than the odour it sends forth when pursued. This offensive humour seems to be a provision of nature designed to compensate for having denied those creatures wings to facilitate their retreat from other voracious insects that are furnished with wings, the smell being alone sufficiently repulsive, it is reported, in many species, to check their ferocious pursuers till they can retire to some place of safety. They

can also, as we may know by experience when handling them, defend themselves extremely well by means of their jaws with which they can pinch smartly, and no doubt inflict a severe wound on the generality of insects; one or two species of the winged kind of carabi, if not more, are able also to terrify their antagonists by making a loud, and frequently repeated snapping noise, which by some has been compared to the explosion of a musquet in miniature. This faculty is more completely exemplified in the little species which the French call *Bombardier*, *Carabus crepitans* of Linn. Faun. Suec. and of later entomologists. It has been affirmed by some lively writers, that “this insect possesses the extraordinary faculty of discharging from behind, on being pursued or irritated, a bluish, fetid, and penetrating vapour, accompanied by a very smart explosion.” “And this operation (it is added) the insect has the power of repeating ten, twelve, or even twenty times in succession with equal violence, thus frequently escaping by terrifying its pursuers.” (Shaw, Zool.) Another historian of this pigmy musqueteer insists that “the smoke emitted at the time of each explosion is so dense as to completely conceal the insect for the space of a few moments from its pursuers, during which interval the wary creature, like an able warrior, may, and does frequently effect its retreat in good order under cover of the smoke occasioned by its own fire.” The recital of this last account excites a smile; we wish that much of the first mentioned circumstances may not prove a gossip’s tale for the credit of those who have assented to it. This insect, it really appears on credible authority, is able to make a loud noise, either by means of the vent, or by rubbing its wing-cases smartly together, and to repeat the noise at pleasure, or as its dangers may require; what has been further stated must be at least received with caution by those disposed even to listen attentively to reports so marvellous.

The ancients considered the carabi as poisonous, and supposed that if their cattle happened to devour any of them, which must often happen when they were grazing, an inflammation of the intestines would ensue. The carabi formed also an article in their materia medica; both Hippocrates and Pliny speak of them, and attribute to them the same properties as the cantharides.

The species of this genus are as follow.

Section 1st. *Thorax heart-shaped*.

CARABUS maxillofus of Thunberg, is one of the largest species of this genus. It inhabits the Cape of Good Hope. Olivier describes the species from a specimen in the Bankian cabinet. This insect is apterous; black; mandibles exerted, and as long as the head; thorax produced behind, and bilobate. Obs. The antennæ are black with the tips fuscous; head exerted, flat in front, with the shield rounded and entire; mandibles acute, or pointed at the tips and entire; shells glabrous, black, and very slightly dotted. Fabr. This must not be confounded with *manticora maxillofa* of Fabricius, which De Geer calls a carabus (*C. tuberculatus*.)

CARABUS thoracicus. Apterous, or without wings, black; thorax lengthened behind into two lobes: sides and margins of the shells villous, white, Fabr. Thunb. Obs. This is much allied to the preceding insect, and inhabits the same country.

CARABUS coriaceus, one of the Linnæan species. This is of the apterous or wingless kind; its colour black and opaque; shells connected, with intricate subrugose dots. Linn. An inhabitant of Europe, and called by Geoffroy Buprestis ater.

CARABUS glabratus; apterous, entirely black, very smooth, and

CARABUS.

and glossy. Fabr. Obs. This is the *Carabus glabratus* of Paykull, and *Carabus convexus* of Herbst. Inhabits Germany and Sweden.

CARABUS violaceus, of Linn. and Paykull, is a species nearly allied to the former. It is apterous, of a black colour, with smooth shells, the edges of which, and the margin of the thorax are violet.

CARABUS purpurascens, is of the apterous kind, and a black colour, with striated shells; margins of the thorax and shells violet. Inhabits Germany. Fabr.

CARABUS cyaneus, *Carabus intricatus* of Linnæus. This is apterous, of a black colour: wing-cases with rough intricate dots. Paykull, Monog. This is called by Geoffroy *Buprestis nigro-violaceus*. Inhabits woods in Europe. Mr. Marsham describes the Linnæan carabus intricatus as an English species. Vide Ent. Brit.

CARABUS catenulatus, of Scopoli. *Carabus problematicus* of Herbst. This insect bears a strong resemblance to *C. purpurascens*, but has the body shorter, and is in other respects distinct. It is of the apterous kind; colour black; thorax and wing-cases edged with azure; shells striated, and marked with a triple row of impressed dots.

CARABUS carolinus. Apterous, black; thorax and shells very smooth, and brassy-green. Inhabits South Carolina.

Described by Fabricius from the cabinet of Gygot d'Orcy of France. It is of a large size with the head black, and brassy behind; thorax brassy with an impressed dorsal line; shells without spots; body and legs black. Fabr.

CARABUS hispanus. Apterous, black; thorax azure; wing-cases rough and golden. Fabr. Found by Prof. Vahl in Spain. Obs. The body is black; margins of the shells azure; legs black.

CARABUS monilis, a native of Saxony, Hybner. This is black, with the thorax coppery; shells striated, coppery-green, with three streaks of oblong elevated dots. Size of the following species.

CARABUS hortenfsis. Apterous, black, shells somewhat rough with a triple series of hollow bronzed dots, and azure margin. Linn. A native of Europe, and inhabits England, Donovan. Brit. Inf. This is the *carabus violaceus* of De Geer. Colour variable from black to greenish or brassy-green. Found in gardens chiefly. About an inch in length.

CARABUS gemmatus. Apterous, black, shells striated with a triple series of double, or two-lobed brassy dots. Fabr. *Carabus striatus* of De Geer. An European species.

CARABUS concolor. Apterous, black, wing-cases striated, with a triple series of excavated dots. Fabr.

This inhabits Germany. Size smaller than *carabus hortenfsis*. The head is black, glossed with copper, and immaculate; thorax black, slightly tinged with azure; excavated dots of the same colour as the shells, not brassy as in *hortenfsis*, and the body black.

CARABUS tadtatus. A North American species of the apterous kind, and black colour; shells somewhat smooth, fuscous, with a triple series of excavated dots. Fabr. Obs. The future of the shells is black.

CARABUS irregularis. This is apterous; head and thorax coppery: shells more dusky, with the margins, and triple series of excavated dots coppery. Found in decayed beech trees in Europe. Helwig.

This resembles *carabus hortenfsis*: the antennæ are black with the first joint ferruginous, its head coppery, and mouth black; shells irregularly punctured; and body black.

CARABUS arvensis. Apterous, black, and coppery; shells striated with a triple series of hollow dots. Paykull,

Monogr. Inhabits Europe, principally Germany. Probably the same as *Carabus catenulatus*, Marsh. Ent. Brit.

CARABUS hungaricus. Apterous, black; shells very smooth, and punctured with a triple row of black dots. Inhabits Hungary, Smidt. Obs. The body is entirely black, and the margins are not bluish, as in some analogous insects.

CARABUS retusus. An insect the size of *C. hortenfsis*, found on the shores of Patagonia, and preserved in the Bankian cabinet. This is apterous; shells striated, greenish, with a triple series of brassy hollow dots, and retuse at the base. Fabr. Obs. The antennæ of this insect are brown, but at the base black; the head greenish, with black mouth; thorax green and impressed on each side at the base; shells with cre-nated striae; body black.

CARABUS Madera. Apterous, black, with the shells retuse at the base.

Described by Fabricius from a specimen in the Bankian cabinet found at Madeira. Much allied to the preceding; the antennæ black with fuscous apex; shells slightly striated, and marked with a triple series of minute greenish impressed dots: legs black.

CARABUS convexus. Apterous, convex, black, smooth, with the posterior part of the thorax emarginate. Paykull. A native of Germany.

CARABUS auratus. Apterous; shells golden and furrowed; antennæ and legs rufous. Linn. Inhabits Europe.

CARABUS splendens. Apterous; above bronzed, and glossy, future of the shells coppery. Found in Jamaica. Bosc. Obs. This is a large species. The head is marked with two furrows, and brassy, its mouth and antennæ black; shells very smooth; body black. *Carabus splendidus* of Gmelin.

CARABUS futuralis. An insect resembling the foregoing that inhabits Terra del Fuego, described by Fabricius, from a specimen in the Bankian cabinet. This is of the apterous kind; shells striated, and greenish with golden future.

The antennæ of this species are dark brown, ferruginous at the base; head green, mouth fuscous; thorax green with golden margin; shells slightly striated with a triple series of ferruginous dots; breast greenish; legs ferruginous.

CARABUS nitens. Apterous; shells rough, greenish, with longitudinal raised lines, golden margin, and black legs. Linn. *Carabus aureus* of Degeer.

CARABUS auronitens. Nearly allied to the former; it is of the apterous kind, with rough greenish shells marked with three longitudinal raised lines, and rufous thighs. Inhabits Germany.

CARABUS morbillosus. Apterous; thorax coppery; shells striated, coppery, with longitudinal elevated dots, and rugged furrows. Fabr.

CARABUS rugosus. Apterous, black; shells with rugose striae, and three rows of elevated dots between them. Described by Fabricius from the cabinet of Sehestedt as a native of Morocco; it is twice the size of *carabus granulatus*.

CARABUS clathratus. Apterous, blackish-brassy, with rows of coppery excavated dots between the striae. Linn. Inhabits Europe.

CARABUS granulatus. Apterous, blackish; shells brassy, with rows of oblong raised dots between the striae. Linn. &c. Inhabits Europe.

CARABUS rostratus. Apterous; shells smooth, and black, and wider than the thorax; head very narrow.

This is an European species, and has been described by authors under various names; Degeer calls it *carabus coadunatus*,

natus, Linnæus tenebrio rostratus, and Paykull as well as Fabricius carabus rostratus, and by Fabricius in his appendix cychrus rostratus.

CARABUS attenuatus. Apterous, black, shells slightly glossed with coppery, with a triple series of elevated dots; thorax narrower; head very narrow. Panzer, &c. This inhabits Europe, particularly Germany: in the last work of Fabricius it stands in the new genus cychrus under the specific name of *attenuatus*.

CARABUS elevatus. Apterous; thorax with reflected margin; shells violaceous; body black. Fabricius.

This and the following species inhabit South America, and are described from the Hunterian museum.

CARABUS unicolor. Apterous; thorax with reflected margin; body black, and shells striated.

CARABUS attelaboides. Apterous, black; thorax somewhat heart-shaped, and narrow; head attenuated behind; shells grooved and furrowed. Fabr. An Indian species, in the Banksian cabinet.

CARABUS leucophthalmus. Apterous, black; shells striated; thorax with short impressed lines at the base. Linn. Inhabits Europe, and is found in England.

CARABUS planus. Winged, depressed, black, with slightly striated wing-cases. Fabr. Ent. Syst. *Carabus spiniger* of Paykull, and *carabus obsoletus* of Faun. Etrusc. Obf. Mr. Marsham in his Ent. Brit. considers this insect the same as the foregoing; namely, carabus leucophthalmus of Linn. Fabricius tells us it is rather larger, and has the body entirely black, and without spots; thorax heart-shaped, smooth, and without the little impressed lines at the base as in the former insect.

CARABUS striatulus. Winged, black; thorax at the base with an impressed dot; wing cases striated, and glabrous in the middle. Described by Fabricius from the Banksian cabinet. Inhabits the shores of Patagonia.

CARABUS subulosus. Winged, pale; head, and dorsal spot on the body black. Fabr. A native of Saxony.

CARABUS arcarius. Winged, pale; with two black dorsal spots on the wing-cases. Inhabits sandy shores of Wales. Described from the Banksian cabinet. Fabr.

CARABUS lateralis. Winged, black; thorax and shells margined with ferruginous. An European species, and inhabits woods. Daldorf.

CARABUS ruficornis. Winged, black; wing-cases furrowed, and slightly downy; antennæ and legs rufous. Paykull, &c. Common in woods in Europe. Inhabits England. Lister, Marsham, &c.

CARABUS picicornis. An Italian species of the winged kind, with the head, antennæ, and legs rufous. Mus. Allioni.

CARABUS flavicornis. Winged, black; margin of the thorax, with the antennæ, and legs yellowish. Paykull. Inhabits Saxony. Hybner.

CARABUS fulvipes. Winged, black; thorax canaliculated; shells striated and smooth; antennæ and legs smooth. Inhabits the woods in Germany. Smidt.

CARABUS piceus. Winged; thorax grooved with two striae on each side; antennæ and tibiae of the legs piceous, or pitchy. Linn. and Schæffer. Found in European woods.

CARABUS femoralis. Winged; head and thorax brassy; wing-cases dusky, and striated; thighs rufous. Inhabits Sierra Leona. Banksian cabinet.

CARABUS terricola. Winged, black, and glossy; wing-cases with smooth striae; extremity of the antennæ, and the legs rufous. Paykull, Monogr. Inhabits Germany, and is found under stones. Fabr.

CARABUS madidus. Winged; thorax with an impressed

black dot on each side at the base; thighs rufous. Paykull. Inhabits England.

CARABUS americanus. Winged, black; thorax, antennæ, and legs ferruginous. A native of America.

CARABUS janus. Winged; thorax ferruginous; wing-cases azure. Fabr. *Carabus bicolor* of Olivier. Inhabits Carolina. Obf. The antennæ are villous, black, with the first joint rufous: head advanced, cylindrical, and brown; body black, with ferruginous feet.

CARABUS fumans. Winged, entirely ferruginous, except the wing-cases, which are blue-black. Inhabits America.

CARABUS crepitans. Winged; head, thorax, and legs ferruginous; wing-cases black. Linn. Le bupreste à tête, corcelet et pattes rouges et étuis bleus. Geoffr.

This is the bombardier of French writers mentioned in the introduction, which is said to possess the faculty of terrifying its enemies by repeated loud explosions and fetid vapours emitted from the vent, whence its name crepitans, "Terrefactus crepitu an hostem pellere tentat." This singular species inhabits Europe. Mr. Marsham describes it as a native of this country. Ent. Brit. Fabricius speaks of a variety of this species about half the size, that occurs in Germany.

CARABUS sclopeta. Ferruginous; wing-cases azure; with the future at the base ferruginous. Fabr. Found abundant in France under stones. It is much smaller than *C. crepitans*; there is a rare variety of it in which the future is the same colour as the wing-cases.

CARABUS spinibarbis. Winged, azure; mouth, antennæ, and tibiae rufous. Inhabits England. Marsham.

CARABUS anecephalus. Winged, bluish-black with striated wing-cases, and a rufous spot on the posterior part. Fabr.

An inhabitant of the South American islands, and allied in appearance to the former. The head is brassy-green, and glossy. Antennæ black, with the first joint rufous. Thorax heart-shaped, punctured, brassy-green with a small impressed line on each side at the base.

CARABUS humeralis. Winged, black with striated wing-cases; spot at the base, and the legs rufous. Inhabits Italy. Allioni.

CARABUS trilobus. Winged, brassy-green; wing-cases with two white spots; antennæ and legs yellow. A native of Guinea. Isert.

CARABUS multipunctatus. Winged, somewhat brassy with numerous irregular impressed dots. Linn, Paykull, &c. Inhabits Europe.

CARABUS oblongopunctatus. Winged, black, with striated wing-cases, and numerous impressed dorsal spots. Inhabits Germany.

CARABUS variolosus. Thorax somewhat cordated or heart-shaped; black; shells azure; base of the abdomen and legs rufous. Fabr. Inhabits Austria.

CARABUS axillaris. Ferruginous; shells striated, and black, with a pale spot at the base. Inhabits Austria. Fabr.

CARABUS cinctus. Winged, fuscous; head and thorax brassy-green; margins of the wing-cases, and legs pale. Inhabits Coromandel. Banksian cabinet.

CARABUS rufipes. Winged, black; antennæ, legs, and margin of the wing cases rufous. Fabr. Mus. Lund. Native place unknown.

CARABUS nitidulus. Winged, black; margin of the wing-cases shining-brassy. Inhabits Kamtschatka. Banksian cabinet. Obf. The head and thorax black, glossed with coppery; wing-cases striated, the striae punctured alternately. Legs black.

CARABUS Dianæ. Winged, black; wing-cases striated; lunule at the base, and the legs ferruginous. Inhabits Saxony. Hybner, &c.

This is of the middle size; head smooth, black; antennæ ferruginous. Thorax heart-shaped, and grooved; body black; legs ferruginous.

CARABUS agilis. Winged, rufous; wing-cases and abdomen black. Paykull. Inhabits Sweden. The crown of the head is black, and the wing-cases truncated.

CARABUS ruficollis. Winged; thorax ferruginous; wing-cases truncated, striated, greenish; head flat, and black. Fabr.

Described as a native of South America from a specimen in the cabinet of Dr. Hunter. It is of the middle size; antennæ black, with fuscous tips; thorax elongated, heart-shaped, and slightly grooved; wing-cases shining; abdomen black with ferruginous vent; legs black, thighs rufous at the base.

CARABUS olens. Winged; thorax rufous; wing-cases fuscous with three rufous spots. Inhabits Italy. Bosc.

This insect very much resembles a cicindela. The body is of the middle size, elongated, and more depressed than usual in the carabus genus. The antennæ are ferruginous, with the first joint longest, incurvated, and thick at the end; head black and glossy, mouth ferruginous; shells slightly striated; legs rufous.

CARABUS fuscatus. Winged; thorax rufous; shells yellowish with a common black band. Paykull, &c. Inhabits Sweden.

CARABUS atricapillus. Winged; thorax rufous; wing-cases testaceous, and obtuse; head black. Linn. Inhabits Enrope. Considered by Fabricius and others as a variety only of Paykull's carabus agilis. It varies frequently in having the margins of the shells black. This insect is found in England.

CARABUS 4-pustulatus. Winged, yellow, with fuscous wing-cases, each marked with two yellow spots. Fabr.

Inhabits Africa. Described from the Banksian cabinet. This is an insect of small size; its antennæ are fuscous; thorax heart-shaped, yellow with an impressed dorsal line; wing-cases slightly striated and truncated.

CARABUS oblongus. Winged, black; thorax oblong; wing-cases striated, fuscous, with yellow antennæ and legs. A native of Germany. Smidt. Obs. This is a small insect, with a black shining head, and yellow feelers; thorax grooved, black, and shining; striæ on the wing-cases crenated; abdomen pitchy.

CARABUS rubens. Winged; thorax ferruginous; wing-cases rounded, testaceous, with the head fuscous. Inhabits Germany. Fabr. This very much resembles carabus atricapillus; the shells are striated, and without spots; the head fuscous.

2d Section. *Thorax narrowed behind.*

CARABUS venator. Apturous, black, with smooth wing-cases, and a grey spot at the base. Inhabits Senegal. Olivier. Obs. The head is advanced, and very large, with each side of the front impressed; thorax behind with acute margin; wing-cases glabrous, and smooth.

CARABUS fulvatus. Apturous, black, with margin of the thorax white; wing-cases furrowed, margin and three spots white. Olivier. This inhabits Senegal, and resembles the preceding; at the base of the wing-cases is a small oblique white line, a white dot before, another behind the middle, and one at the apex.

CARABUS nimrod. Apturous, black; wing-cases furrowed with two remote villous grey spots. Olivier. This also is a native of Senegal. The body is black; thorax immaculate.

CARABUS 10-guttatus. Apturous, black; shells with nine furrows, and ten white dots. Linn. Inhabits Africa. Called by Degeer carabus alboguttatus.

CARABUS 6-guttatus. Apturous, black; wing-cases smooth; with two grey spots. Inhabits India. Olivier, Donovan. Inf. Ind. &c. This is of a large size; the shield is square, and entire: jaws advanced, bent, and pointed; legs black.

CARABUS 4-guttatus. Apturous, black; thorax with two large pitchy tubercles, and a small grey dot on each side; wing-cases furrowed; with elevated carinated lines, and two remote grey spots. A native of Africa.

CARABUS 7-guttatus. Apturous, black; above brown; shells striated with seven white dots. Fabr. Inhabits the Cape of Good Hope.

CARABUS tabidus. Apturous, black; wing-cases with rugose furrows. Fabricius.

Described from the Banksian cabinet as a native of the Cape of Good Hope. Its size is about half that of carabus 4-guttatus; the front is grooved on each side; thorax with two raised dorsal lines on the back part; wing-cases rather pointed behind; body deep black.

CARABUS nigripennis. Apturous, rufous; shells grooved, and black. Inhabits the Cape of Good Hope. Voet. &c.

CARABUS variegatus. Apturous; wing-cases flat and smooth, with white sinuate margin and spots on the disk. A native of the East Indies, described by Forskal. Obs. The eyes are testaceous; lateral margin of the thorax whitish; wing-cases with five white dots in the disk; body black.

CARABUS exclamatoris. Apturous; margin of the thorax white; wing-cases with a white margin, line, and dot in the middle. Fabricius. From Barbary.

CARABUS trilineatus. Apturons, black; edges of the thorax white; wing-cases whitish, with black line and suture. Inhabits Germany. Described by Thunberg under the name of carabus lineatus.

CARABUS cephalatus. Winged, black, very smooth, with convex thorax. Linn.

CARABUS cicindeloides. Apturons, and black; wing-cases ovate, flat, ferruginous, and villous edged with white. Inhabits the Cape of Good Hope, Stockh. Transf.

CARABUS levigatus. Winged, black, depressed; thorax and shells very smooth. Inhabits Coromandel.

CARABUS interruptus. Winged, black; thorax and wing-cases remote. Inhabits the East Indies. Herbst. Scarites clypeatus. Rossi.

CARABUS tricuspidatus. Winged, black; antennæ, and legs ferruginous; shield tricuspidate. Inhabits Barbary. Mus. Destontaines.

CARABUS calydonius. Winged; head with an obtuse projecting horn; mandibles horned.

Scarites calydonius, Rossi. This kind inhabits Italy. The head is large with a large obtuse compressed horn in front; mandibles with a strong recurved tooth; shells punctured in striæ.

CARABUS complanatus. Winged, yellowish, with two black bands on the wing-cases. Linn. Found in St. Domingo.

CARABUS bimaculatus. Winged, black; head and wing-cases truncated; dot at the base, and band in the middle ferruginous. Linn. Inhabits India. Donovan. Inf. Ind. Obs. The thorax is variable in this species, being sometimes yellow, sometimes black, and not unfrequently spotted.

CARABUS tripustulatus. Winged, black; with two yellow spots on each wing-case, the posterior ones approximate; legs yellow.

CARABUS.

A native of Siam. Size of the last species, and which, as Fabricius intimates, may prove to be only a variety of it. The head is flat, smooth, and black, with the mouth testaceous; thorax flat, smooth, black and without spots; wing-cases striated, black with two large yellow spots; the legs yellow, with a single tooth on the anterior shanks.

CARABUS 6-pustulatus. Rufous with black wing-cases, and three red dots. Inhabits the East Indies. Edler.

The head and thorax are rufous; wing-cases striated, and black, the red spot at the tip lunate; abdomen rufous with black margin; legs rufous.

3d Section. *Thorax square*.

CARABUS variolosus. Apterous, black; shells sprinkled with irregular impressed dots.

Inhabits Transylvania. Saldoner. It is of a large size, and entirely black: antennæ black with fuscous tips; thorax margined; shells connected, and variously sprinkled with large irregular impressed dots, some of which are confluent.

CARABUS striola. Apterous, depressed; black; two impressed lines on each side of the thorax at the base; shells striated. Fabr.

Much allied to *carabus leucophthalmus*, but is broader, and more depressed; the colour is entirely black. Inhabits Saxony.

CARABUS metallicus. Apterous, black, with a small impressed line on each side of the thorax at the base; thorax and shells brassy. A native of Saxony. Smaller than the preceding. Head black; feelers somewhat ferruginous; thorax brassy, shining, and grooved in the middle; shells slightly striated; body black. There is a variety of it with dusky thorax; and coppery shells. Hybner, &c.

CARABUS politus. Winged, glossy-black; wing-cases striated; antennæ rufous. Inhabits the East Indies.

Described from the cabinet of Lund. In size and appearance it much resembles *C. leucophthalmus*; the head is large and exserted; antennæ rufous with the first joint black; lip heart-shaped; jaws strong and thick at the extremity; thorax grooved; body black.

4th Section. *Thorax rounded, with a slightly prominent obtuse margin*.

CARABUS alternans. Apterous, black; shells with reticulated striæ, which are broader alternately, and marked with a triple series of elevated brassy-dots retuse at the tip. Fabricius.

This insect resembles the next species; the antennæ are black, cinereous at the tip; head large; eyes globular, prominent, and testaceous; thorax black, and immaculate; shells deeply striated, and intersected with smaller ones, the longitudinal striæ alternately broader; and three streaks of oblong raised brassy dots; legs black. Inhabits South American islands.

CARABUS calidus. Apterous, black; shells with crenated striæ; the striæ equal, and marked with a triple row of indented golden dots. Inhabits South American islands. Mus. von Rohr. Obs. The antennæ are reddish at the tip, and on each side near the base of the wing-cases is a single golden dot.

CARABUS sericeus. Apterous, black; an impressed dot on each side the thorax at the base; shells somewhat striated, with a triple row of brassy dots. Inhabits Germany. Smidt. Allied to the two preceding, but distinct. The antennæ are black, at the tip fuscous; head black; thorax and body black. Fabr.

CARABUS porcatus. Apterous, black; shells striated and granulated at the tip.

Inhabits New Holland, and is described by Fabricius from

a specimen in the Banksian cabinet. This is of a moderate size.

CARABUS reflexus. Apterous, black; wing-cases furrowed, with two yellow spots. Inhabits Coromandel. Obs. The head is black, and impressed on each side; thorax unequally punctured, and slightly reflected at the edge; shells connected, with eight grooves; legs black.

CARABUS angulatus. Apterous, hairy, and black; thorax canalculated; shells grooved, with two interrupted yellow bands. Inhabits Coromandel. Fabr.

CARABUS cassideus. Apterous, black; thorax margined; shells smooth. Found in France. Bosc.

CARABUS silyboides. Apterous, black, with margined thorax; shells striated, punctured, with rows of larger punctures. Inhabits France and Italy. Rossi.

CARABUS globosus. Apterous, black, with convex thorax, and striated shells. A native of Morocco. Scheffelt.

CARABUS indagator. Apterous; shells very smooth, with a triple row of brassy dots. Inhabits Barbary. Believed to be the *carabus auro-punctatus* of Paykull.

CARABUS sycophanta. Winged; glossy-violet; wing-cases golden and striated. Linn. Inhabits woods in Europe.

CARABUS inquisitor. Winged; wing-cases striated, brassy-green, with a triple series of dots. Linn. A native of Europe, and frequents woods.

CARABUS scrutator. Winged; wing-cases striated, greenish, with a triple series of dots; thorax azure; margin reflected and golden. Inhabits Virginia. Fabricius.

CARABUS reticulatus. Winged, black; wing-cases reticulated, brassy-green; the margin of the thorax greenish. Inhabits Europe. Zschuck.

In size and appearance resembles *carabus inquisitor*; the antennæ are black, with the last joint ferruginous; wing-cases very finely reticulated.

CARABUS longicornis. Winged, black; head and thorax dotted; wing-cases with crenated striæ; antennæ and legs ferruginous. A native of Morocco. Fabr. Obs. The antennæ are nearly as long as the body, whence its specific name *longicornis*: the head is black, with ferruginous feelers; thorax rounded at the sides, dotted, and black; wing-cases black, and without spots; thighs blackish.

CARABUS brevicollis. Winged, black, with ferruginous antennæ.

This insect inhabits Germany. Helwig.

CARABUS rotundicollis. Pitchy-ferruginous; shells paler antennæ and legs pale testaceous. Inhabits England. Marsh. Ent. Brit.

CARABUS ochropus. Pitchy black; antennæ and legs pale testaceous. A native of England. Marsham.

CARABUS punctulatus. Winged, depressed, black; shells punctured, slightly striated, and retuse at the base. Inhabits Saxony. Paykull, &c.

The head is smooth and black; antennæ short and brownish; thorax smooth, black, and immaculate; wing-cases nearly smooth; body black; shanks of the legs spinous.

CARABUS obscurus. Black and winged; thorax dotted; wing-cases striated; legs piceous. Inhabits Saxony, Hybner; and England, Marsham. Rather larger than *carabus ruficornis*.

CARABUS micans. Winged; shells shining gold with a testaceous spot at the tip; legs rufous. Country unknown. Bosc. Obs. The head is smooth and coppery; thorax grooved, and glossed with green; body black.

CARABUS bicolor. Winged; above black, beneath ferruginous. Inhabits North America. This resembles *carabus*.

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bus obscurus, but differs in having all the lower surface with the legs and antennæ ferruginous.

CARABUS holosericeus. Winged, silky-black; head brassy and shining. Fabr. Obs. The head is brassy, with the mouth and antennæ black; wing-cases striated; legs black.

CARABUS fulvatus. Winged, black; thorax variolous; wing-cases grooved, with a ferruginous spot in the middle. Found at the Cape of Good Hope. Fabr.

CARABUS 2-notatus. Winged, black; head with two rufous dots in front; antennæ yellow at the base. Inhabits Germany. Daldorf.

The body of this species is entirely black; head smooth and glossy; thorax smooth; wing-cases striated; legs variable from red to black.

CARABUS fulvicollis. Winged, azure; mouth, thorax, and thighs rufous; wing-cases striated, and truncated. Inhabits Barbary. Fabr.

CARABUS pilicornis. Winged; shells striated with impressed dots; antennæ hairy. Fabr. Inhabits England. Donovan. Brit. Inf.

CARABUS semipunctatus. Winged; thorax roundish; wing-cases fuscous, striated, with anterior hyaline spots, and dots on the posterior half. A new species lately discovered in South Wales. Donovan. Tour. 1805.

CARABUS ceruleus. Winged, bluish black, with striated wing-cases; antennæ at the base red. Linn. *Carabus virens*. Myller. Obs. This species varies in colour from bluish to brassy, coppery and green.

CARABUS lepidus. Winged, brassy-green; thorax with two striae on each side; wing-cases striated. Fabr. *Carabus lepidus*. Leske. Itin. A native of Europe.

CARABUS schach. Winged, black, with striated wing-cases, and a large oblong spot behind; antennæ and legs rufous.

This kind inhabits South America, and resembles in size and appearance *carabus pilicornis*. The head is black; striae on the wing-cases crenated; body black.

CARABUS cupreus. Winged, coppery; base of the antennæ red. Linn. Inhabits woods in Europe.

CARABUS carnifex. Winged, brassy-green; antennæ and legs rufous. Found in Terra del Fuego. Bankian Cabinet.

This is of a small size; head brassy, and shining; mouth ferruginous, posterior part of the thorax with an impression on each side; wing-cases striated, and subretuse at the tip.

CARABUS vulgaris. Winged, brassy-black; antennæ and legs black. Linn. Very common in sandy places in Europe. Obs. This is *carabus ovatus* of Rossi, Helw. &c. and *carabus affinis*, Schrank.

CARABUS communis. Winged, brassy; antennæ at the base and the shanks rufous. Marsham, Panzer. Rather smaller than the former, and is found in similar situations. Panzer speaks of a variety that has the legs entirely rufous instead of the shanks only.

CARABUS ovatus. Winged, black; shells striated and smooth; antennæ and legs ferruginous. Fabricius. Inhabits Saxony.

CARABUS latus. Winged, black; shells with crenated striae, antennæ and legs ferruginous. Linn. Inhabits Europe. The species is sometimes found in England, in woods.

CARABUS abdominalis. Winged, black; antennæ, disk of the abdomen, and legs ferruginous. Inhabits the Cape of Good Hope. Fabr.

Resembles the former in size and aspect; the head is

black; feelers ferruginous; thorax smooth and black; shells striated, black, and without spots.

CARABUS helopioides. Winged, black; wing-cases with smooth striae; antennæ and legs black. A native of Germany. Helwig. Entirely resembles the Fabrician *carabus ovatus*, except in being totally black.

CARABUS azureus. Winged, azure; antennæ and legs red. Bergstr. Nomencl. Inhabits Germany.

CARABUS erythrocephalus. Winged, black; head rufous; antennæ and legs yellow. Fabr.

This is a native of Germany, and is of a moderate size; the thorax is black and glossy; wing-cases striated and black.

CARABUS analis. Winged, black; mouth, antennæ, vent, and legs ferruginous. Fabr. This resembles the former in size and aspect; the head is black; thorax black, with an impressed dorsal line, and two little impressed lines at the base; wing-cases black, with crenated striae. Inhabits Germany. Smidt.

CARABUS lineola. Winged, ferruginous, with a small black line on the wing-cases. Described from the Bankian Cabinet. The species inhabits North America.

CARABUS ferrugineus. Winged, ferruginous, and entirely convex. Marsh. Inhabits England, and the rest of Europe. *C. ferrugineus* of Linn. Paykull, &c.

CARABUS rufimanus. Winged, black, and convex; antennæ and soles of the feet ferruginous. Marsh. Inhabits England.

CARABUS pallens. Winged, pale, with striated wing-cases. Fabr. Is found in Saxony.

CARABUS Surinamensis. Winged, testaceous; thorax and wing-cases striated and fuscous. Inhabits Surinam.

CARABUS dorsiger. Winged, ferruginous; shells with a broad black lunule; abdomen black. Fabr.

This is a native of Barbary. The head is dusky; shells striated; legs ferruginous.

CARABUS aterrimus. Winged; thorax margined, black; wing-cases black, striated, with three impressed dots. Inhabits woods in Europe. Fabr. &c.

CARABUS æneus. Winged, above brassy; antennæ and legs ferruginous. Fabr. This is an European species, and inhabits England. The body varies from black to ferruginous.

CARABUS nigricornis. Winged, green, downy, with numerous punctures; thorax shining golden; wing-cases with obsolete striae and dusky; legs piceous. Marsh. Inhabits England. Obs. This is *carabus nitidulus* of Thunberg.

CARABUS parumpunctatus. Winged, oblong, and brassy above; beneath black; wing-cases striated, with six impressed dots; shanks piceous. Fabr. Found in Germany.

CARABUS 6-punctatus. Winged; head and thorax greenish; wing-cases coppery. Linn. An European species.

CARABUS discoideus. Winged, black, outer margin of the wing-cases, with the antennæ, rufous. Inhabits Germany. Smidt.

CARABUS marginatus. Winged, green, margin of the wing-cases and the shanks testaceous. Linn. Inhabits woods in Europe.

CARABUS vestitus of Paykull and Fabricius is supposed to be a variety of the Linnæan *carabus marginatus*. It is of the winged kind, green-brassy colour, with the edges of the thorax, and wing-cases, with the antennæ and legs pale. Geoffr. Fabr. &c. Inhabits Hungary.

CARABUS pallipes. Winged, black; border of the thorax and

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and wing-cafes, with the legs pale. Described by Fabricius from the Hunterian Museum, as a native of America. Obf. The antennæ are black pale at the base; head black, with ferruginous mouth; shells striated; body black.

CARABUS fuscus. Winged, fuscous; wing-cafes obsoletely striated; antennæ, margin of the thorax, and legs yellow. Inhabits Germany.

CARABUS nigrita. Winged, black and glossy; thorax canaliculated; wing-cafes striated. A native of Europe.

CARABUS quadrum. Winged; thorax rounded, black; wing-cafes striated with a pale stripe. Inhabits Senegal. Bosc.

CARABUS melanocephalus. Winged; thorax and legs ferruginous; head and wing-cafes black. Linn. Paykull, &c.

This is *lupreftris dorso rubro* of Panzer, and *le luprefle noir à corcelet rouge* of Geoffr. Found in woods of Europe, and in England. The head is black; wing-cafes deep black, and striated; thorax red. Linn. Fn. Su.

CARABUS cyanocephalus. Winged; thorax and legs ferruginous; head and wing-cafes blue. Linn. Inhabits European woods, and is found in England. Donovan. Brit. Inf.

CARABUS rufibarbis. Winged, black; antennæ, mouth and legs rufous. Found in Germany. Smidt. Size of the preceding; body black and glossy; thorax slightly canaliculated; wing-cafes striated; mandibles of the mouth black.

CARABUS lividus. Winged, yellowish; head and thorax black; wing-cafes fuscous and striated. Inhabits Denmark. Lund. This insect is of a small size. The mouth is black; antennæ pale; thorax smooth, black, and without spots; body and legs yellowish.

CARABUS amethystinus. Winged, azure; head and thorax shining-brassy. Fabr.

Described as a native of Cayenne, from the cabinet of Von Rohr. The antennæ are hairy, brown, with ferruginous base; wing-cafes striated; body azure.

CARABUS crux-major. Winged; thorax orbiculate; wing-cafes black, with two rufous spots. Linn.—Thorax yellow, glabrous; wing-cafes behind black, with two yellow spots. *Carabus crux-minor*. Marsh. Ent. Brit. *Carabus crux-major*. Fabricius. Inhabits Europe. Obf. *Carabus bipustulatus* of Fabricius, which that author describes as an English insect, and refers to the cabinet of Lee, is this species.

CARABUS crux-minor. Winged; thorax orbiculate and rufous; shells truncated and red, with a black cross. Linn. *Carabus crux-major*. Marsh. Ent. Brit. *Le chevalier noir* of Geoffr. and *Buprestis cruciata* of Panzer. This inhabits European woods, and is, as well as the preceding species, found in England, but rarely.

CARABUS vittatus. Winged; thorax orbiculate, and rufous; wing-cafes black, with a white stripe. Inhabits North America. Fabricius. Obf. The antennæ of this are black; head rufous; scutellum small, and of the same colour; wing-cafes glabrous, with a longitudinal white stripe on a black ground; margin rufous; body ferruginous with black legs.

CARABUS turcicus. Winged; thorax orbiculate and rufous; wing-cafes black, with a pale lunule at the base.

The country of this insect, which Fabricius describes from the Hunterian Collection, is unknown. The head is black; mouth and antennæ reddish; thorax margined, and without spots; wing-cafes striated, slightly truncated, black; abdomen black; legs pale.

CARABUS hemorrhoidalis. Winged; thorax somewhat orbiculated, and rufous; wing-cafes black, and rufous at the tip.

Found at Dresden. Mus. Romanus. The antennæ are rufous, blackish at the tip; head and thorax without spots; wing-cafes slightly striated, and the body black.

CARABUS picipes. Winged; thorax orbiculated, glossy-black; wing-cafes fuscous, with ferruginous legs. Inhabits Sweden. Paykull.

CARABUS andree. Winged; thorax orbiculated, shining-black; wing-cafes pale, with a black spot in the middle. Inhabits Italy. Dr. Allioni.

CARABUS elevatus. Rufous; wing-cafes silky and pale, with a common black band. Found in France. Bosc.

CARABUS germanus. Winged, azure; head, wing-cafes, and legs testaceous. Linn. Inhabits woods of Germany. Schæffer.

CARABUS velox. Winged, blackish, antennæ and legs pale; wing-cafes very obtuse. Linn. Found in sandy places in Europe.—Obf. The wing-cafes are striated, obtuse, and almost truncated.

CARABUS rufescens. Winged, ferruginous, crown of the head and tail black. Fabr. An English species in the Hunterian Collection. It is of a small size, and entirely ferruginous, except the crown and tail. *Carabus rufescens* of Paykull.

CARABUS praustus. Winged, testaceous; crown of the head, tip of the wing-cafes, and the abdomen black. Inhabits Germany. Smidt. Obf. This is of an oblong figure; the mouth and antennæ are testaceous; thorax rounded, smooth, and without spots; shells striated; body testaceous, with black abdomen; legs testaceous.

CARABUS apricarius. Black above, beneath ferruginous; wing-cafes with crenated striæ. Paykull, Monogr. Inhabits the sandy plains of Dalekarlia. Supposed to be the *carabus fulvus* of Geoffr. and Degeer.

CARABUS lunatus. Winged; thorax orbiculate and rufous; shells yellow, with three black spots. Fabr. *Carabus eques*, Schrank, Beytr. This insect is found in England.

CARABUS prasinus. Winged, black: head and thorax brassy; wing-cafes ferruginous, with a large, common, black spot at the tip. Inhabits Europe. Fabr. *Carabus veridanus* of Paykull.

CARABUS cursor. Winged; thorax brassy-green; shells black, with a ferruginous spot at the tip. Inhabits Italy. Dr. Allioni.

CARABUS furcatus. Livid; wing-cafes with a black abbreviated line in the middle, forked at the base.

This is of a small size, and inhabits America. The head is dusky, with a black spot between the eyes, and the wing-cafes are striated.

CARABUS discus. Winged; thorax rufous; head black; wing-cafes testaceous, with a common dorsal fuscous spot. Inhabits Germany. Smidt. Obf. This is small, and has the mouth and antennæ black; thorax rounded; wing-cafes striated; legs rufous.

CARABUS meridianus. Winged, black; anterior part of the wing-cafes and the legs testaceous. Linn. *Carabus meridianus*, Paykull. Inhabits sandy places in Europe.

CARABUS vaporariorum. Winged; thorax, anterior part of the wing-cafes, with the margin, antennæ, and legs ferruginous. Linn.

CARABUS comma. Winged, black, with fuscous thorax; wing-cafes grey, with a linear black spot. Inhabits America. Drury.

CARABUS 4-maculatus. Winged; thorax ferruginous and glabrous; wing-cafes very obtuse and fuscous with two white spots. Linn.

CARABUS 4-guttatus. Winged; thorax deep black; shells black, with two white dots on each. Described by Fabricius

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Fabricius as an English insect. *Carabus 4-guttatus* of Paykull.

CARABUS ustulatus. Winged; thorax black; wing-cafes dusky, with two pale bands. Inhabits Europe. *Carabus dentellus*, Thunberg, and *Elophorus rupestris*, Fabr. Mant. &c.

CARABUS dorsalis. Winged; thorax black; shells pale, with a large black dorsal spot. Fabr. Inhabits Germany.

CARABUS biguttatus. Winged; thorax brassy; wing-cafes black, with a pale spot at the tip. Inhabits woods of Norway.

CARABUS guttula. Winged, deep black, with a white hyaline spot on the posterior part of the wing-cafes. A native of Germany. Smidt. *Carabus riparius* of Paykull.

CARABUS testaceus. Winged; head and thorax ferruginous; wing-cafes testaceous. Linn. Found in Europe.

CARABUS truncatus. Winged; thorax ferruginous; wing-cafes striated, abbreviated, and black. Inhabits Saxony. Hybner.

CARABUS bipunctatus. Winged, brassy; antennæ and legs black; shells with two impressed dots. Linn. An European species.

CARABUS abbreviatus. Winged; thorax rufous; wing-cafes abbreviated and testaceous. Found among the rocks of Norway. Fabr.

CARABUS celer. Winged, brassy, and shining; legs ferruginous. Found among mosses in Europe. Fabr.

CARABUS minutus. Winged, black; shells and legs piceous. Inhabits Germany, and lives in the trunks of trees. Smidt.

Obf. This, as the name implies, is a small species. The head is black; antennæ piceous; thorax roundish, black, and without spots; wing-cafes striated; body black, and legs ferruginous.

CARABUS pygmaeus. Winged; above shining-brassy; beneath deep black. Inhabits Germany. Smidt.

CARABUS tristis. Winged, black, with rufous legs. Found in Germany. Smidt. Obf. Small; antennæ entirely black; head and thorax glabrous and black; wing-cafes striated. Paykull speaks of a variety of this insect with piceous legs, which he says is found in Sweden.

CARABUS truncatellus. Winged; above dusky-brassy; beneath deep black; wing-cafes obtuse. Linn. Inhabits Europe. Size small; antennæ and legs deep black.

CARABUS minimus. Winged, deep black, with striated shells. Inhabits Germany. Smidt. Obf. This is very small; head and thorax black, and without spots; antennæ and legs black.

5th Section. *Thorax various, or uncertain.*

CARABUS rugulosus. Apterous, thorax angulated behind, brassy; shells greenish, fore-part striated; tip and margin rugose. Marsh. Inhabits England.

CARABUS gibbosus. Thorax truncated behind, and entire; ovate, convex, gibbous; wing-cafes with crenated striæ; legs and antennæ piceous. Marsh. Taken near Colchester, by the late Mr. Curtis, on *Rubus fruticosus*.

CARABUS rufungulus. Thorax truncated behind, and entire, black; wing-cafes dusky; antennæ and legs ferruginous; margin of the thorax rufous. Inhabits England. Marsh.

CARABUS tibialis. Glossy black; shanks and soles of the feet piceous, ferruginous. Found in England. Marsh.

CARABUS convexus. Black; wing-cafes striated; striæ dotted; antennæ ferruginous; legs piceous. An English species. Marsh.

CARABUS discolor. Above shining-azure; beneath ferruginous. A new English species. Marsh.

CARABUS immunitis. Blue-black, with testaceous legs. Inhabits England. Marsh.

CARABUS echinatus. Ferruginous and hispid; head and thorax dusky, punctured; wing-cafes striated, with a large black spot. Inhabits England. Marsh.

CARABUS lateralis. Black; sides of the thorax behind ferruginous; legs pale. A native of England. Marsh.

CARABUS punctonaculatus. Black, smooth, and glossy; shells truncated, with two white spots. Inhabits England. Marsh.

CARABUS acutus. Brassy-black and very glossy; wing-cafes somewhat attenuated, and pointed; shanks pale. Inhabits England. Marsh.

CARABUS femoralis. Dusky-black; wing-cafes somewhat truncated at the tip; thighs pale at the base. Inhabits England. Marsh.

CARABUS dilutus. Pale ferruginous; eyes black; legs pale testaceous. Inhabits England. Marsh.

CARABUS elegantulus. Black; antennæ ferruginous; wing-cafes and legs testaceous. An English species. Marsh.

CARABUS ochropus. Piceous-black; antennæ and legs pale testaceous. Inhabits England. Marsh.

CARABUS rugimarginatus. Ferruginous-black, and rather depressed; striæ on the wing-cafes deeply punctured; margin of the thorax rough with dots. Inhabits England. Marsh.

CARABUS circulatus. Black; antennæ, legs, and margin of the shells testaceous. Found under stones by the side of the river Usk, near Crickhowell, Monmouthshire. Marsh.

CARABUS purpureo-carulefcens. Bluish-black; wing-cafes striated, with numerous punctures between the striæ; antennæ, feelers, and legs rufous. Found near Maldon in Essex. One of the new English species described by Mr. Marsham. Ent. Brit.

CARABUS nitidulus. Bluish-black and glossy; antennæ at the base, shanks, and tarsi reddish; wing-cafes striated with punctures. Marsh. Inhabits England.

CARABUS pulchellus. Bluish-black and glossy; legs reddish; shells striated with dots. Marsh. Inhabits England.

CARABUS ruficollis. Black; head black and glossy; antennæ, thorax, and legs rufous-ferruginous. Inhabits England. Marsh.

CARABUS fulvus. Ferruginous; legs paler; eyes black. Inhabits England, and varies in having the legs more or less pale.

CARABUS inæqualis. Black; antennæ and legs rufous. Inhabits England. Marsh.

CARABUS foraminulosus. Piceous, thorax dotted; shells striated; legs ferruginous. Inhabits England. Marsh.

CARABUS nigriceps. Ferruginous; head black; thorax very glabrous, and somewhat obcordated. Inhabits England. Marsh.

CARABUS linearis. Ferruginous-fuscous; wing-cafes paler, abbreviated, and truncated at the tip; legs pale. Olivier, &c. Inhabits England. Marsh.

CARABUS leprosus. Blue; base of the antennæ, and legs ferruginous; shells brown, with two white spots. Inhabits Denmark. Pontopp.

CARABUS Inderiensis. Dusky-green, beneath black; legs testaceous; shells striated, the lateral margin yellowish-grey. Inhabits Siberia. Pallas.

CARABUS alacer. Apterous, black, and without spots; thorax

CARABUS.

thorax rounded behind and grooved. Inhabits the Cape of Good Hope. Thunberg.

CARABUS lunulatus. Apterous, black; thorax lunated; wing-cases striated. Thunberg. Inhabits the Cape of Good Hope. Obs. This is about the size of *Carabus violaceus*, but broader and more depressed.

CARABUS difformis. Apterous, black; thorax transverse, truncated behind; shells striated. Thunberg. An African species, found at the Cape of Good Hope. Size of *C. horrensis*.

CARABUS dorsalis. Black; antennæ and wing-cases red, with a black margin. Inhabits the Cape of Good Hope. Thunberg.

CARABUS obtusus. Thorax and wing-cases fuscous; head, antennæ, and legs red. Found at the Cape of Good Hope. Thunberg.

CARABUS aser. Black; antennæ and legs reddish; wing-cases smooth. Thunberg. Inhabits the Cape of Good Hope. Same size as *Carabus vulgaris*.

CARABUS Capensis. Ferruginous; thorax and future of the shells with a longitudinal black line. Inhabits the Cape of Good Hope. Thunberg. Obs. The body is glabrous; abdomen black or ferruginous.

CARABUS fascialis. Ferruginous; shells with a black band. Inhabits the Cape of Good Hope. Thunberg. This is very closely allied to *Carabus fasciatus*, and may be the same species.

CARABUS fimbriatus. Apterous, black; sides of the thorax, and margin of the wing-cases downy white. An African species. Herbst.

CARABUS Herbstii. Shells transversely undulated with three rows of golden dots. Inhabits Germany.

CARABUS Pomeranus. Coppery, beneath black; shells with three rows of raised dots, and decussate striæ. A native of Pomerania. Herbst.

CARABUS cylindricus. Black, cylindrical; thorax narrowed, and grooved in the middle; shells with nine grooves, and dotted on the outer margin. Herbst.

CARABUS marchicus. Beneath black; head and thorax light grey; feelers and antennæ brown, ferruginous at the base. Inhabits Prussia. Herbst.

CARABUS splendidus. Brown; head and thorax brassy-green; legs pale. Inhabits India. Herbst.

CARABUS mango. Piceous; legs spinulose; antennæ and margin of the thorax yellowish; shells with eight striæ. Inhabits India. Herbst.

CARABUS Frischii. Black; thorax with a single groove, and eight furrows on the wing-cases. Inhabits Prussia. Herbst. Gmel.

CARABUS Indicus. Black; antennæ grey at the tip; thorax with an impressed line; wing-cases with seven grooves. Inhabits India. Herbst.

CARABUS Mulleri. Brassy-black; wing-cases striated and punctured with three impressed dots. Inhabits Europe. Herbst. Gmel.

CARABUS atratus. Entirely glossy-black; thorax rounded; shells obsoletely striated, with four indented dots at the future. Inhabits Prussia. Herbst. Gmel.

CARABUS fusco-rufus. Reddish-brown; shells striated; thorax rounded. Inhabits Germany. Herbst. ap. Fuesli.

CARABUS lapideus. Black, beneath brown; shells blue, with nine punctured striæ, the outermost crenated. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS platys. Totally black; thorax slightly margined; shells glabrous, and obsoletely striated. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS virgo. Black; antennæ and legs brown; the

thorax sinuated behind; shells obsoletely striated. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS glaber. Glossy-black; shells brown, striated; mouth, feelers, and legs piceous. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS globator. Black; thorax hemispherical; shells striated with punctures; mouth and feelers ferruginous; antennæ fulvous, and nearly moniliform at the base. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS lampros. Glossy, very smooth, brassy-black; beneath black; wing-cases striated with punctures; antennæ grey; legs brown. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS pyropus. Glossy-black; margin of the thorax raised; antennæ and legs piceous. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS micros. Bay-brown; shells striated with punctures; eyes black. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS chalcos. Brassy; beneath black; antennæ ferruginous at the base; wing-cases striated with punctures. Inhabits Prussia. Herbst. ap. Fuesli.

CARABUS mixtus. Pale yellow; head black; posterior part of the wing-cases speckled with black. Herbst. ap. Fuesli. Inhabits Prussia.

CARABUS spinosus. Apterous, black; shells with eight grooves, and roughly dotted, posterior part spinous. Inhabits the Cape of Good Hope. Voet.

CARABUS Thunbergii. Wing-cases testaceous, with a common violet spot; head and thorax black. Inhabits Upsal. Upf. Transf.

CARABUS Upsalienfis. Wing-cases green, striated; thorax flat, brassy, and punctured. Inhabits Upsal. Upf. Transf.

CARABUS pictus. Depressed, testaceous; striæ on the wing-cases and the legs grey. Found by Pallas in the sandy deserts of Siberia, under carrion.

CARABUS didymus. Bluish-black; wing-cases yellow, with a double fuscous spot. Inhabits Denmark. Müll.

CARABUS minimus. Thorax somewhat black; wing-cases striated; legs and antennæ fuscous. Inhabits Denmark, infests plants, and is scarcely larger than a flea. Müll. Fn. Fridrichsd.

CARABUS flavus. Yellow; wing-cases striated; head, thorax, and spot at the tip of the wing-cases green. Inhabits Denmark. Müll.

CARABUS fenestratus. Black; wing-cases fuscous, with oblique, yellow, semi-transparent spots. Inhabits Denmark. Müll.

CARABUS inflexus. Black; shanks and joints of the feet piceous; wing-cases with a flexuous series of impressed dots. Inhabits Denmark. Müll.

CARABUS flavipes. Black; wing-cases brassy; legs and antennæ fulvous. Inhabits Denmark. Müll.

CARABUS nigricans. Black; wing-cases, antennæ, feelers, and legs piceous. Inhabits Denmark. Müll.

CARABUS coruleus. Black; wing-cases azure; antennæ, feelers, and legs fulvous. Inhabits Denmark. Müll.

CARABUS similis. Black; posterior part of the thorax excavated at both sides; striæ of the wing-cases slightly dotted. Inhabits Denmark. Müll.

CARABUS æstivus. Yellow; head ferruginous; thorax and wing-cases black. Inhabits Denmark. Müll.

CARABUS flexilis. Yellowish; head black; wing-cases livid. Inhabits Scandinavia. Müll.

CARABUS lugubris. Black, opaque; antennæ and feelers fulvous; shanks and tarsi ferruginous. Inhabits Europe. Müll.

CARABUS.

CARABUS pubescens. Black, downy; wing-cafes striated; antennæ, feelers, and legs fulvous. Inhabits Europe. Müll.

CARABUS levis. Brassy; head and thorax green; wing-cafes coppery; legs piceous. Inhabits Denmark. Müll.

CARABUS vernalis. Black; antennæ, feelers, and legs yellow; wing-cafes striated with dots. Müll.

CARABUS pïllus. Black; wing-cafes striated; legs piceous. Inhabits Denmark. Müll.

CARABUS aurichalceus. Yellowish, above brassy. Inhabits Denmark. Müll.

CARABUS rubicundus. Apterous, beneath black; thorax violet; wing-cafes reddish, the future and margin white. Lepechin. Inhabits Russia.

CARABUS Forsteri. Black; head, thorax, and shells glossy-green; antennæ and legs rufous. Inhabits America. Forster.

CARABUS lineatus. Thorax ferruginous; wing-cafes grey, with a common black line at the future, and another in the middle; legs grey; tarsi black. Inhabits America. Forster.

CARABUS fulvicornis. Black; wing-cafes with smooth striæ, the outermost punctured; feelers, antennæ, and legs pale yellow. Inhabits Europe. Hoppe.

CARABUS adpersus. Apterous; above brassy-green, beneath black; wing-cafes with four rows of indented golden dots and raised lines. Inhabits Europe. Degeer. Gmelin.

CARABUS varius. Above brassy-black, beneath black; body ovate and short; thorax convex; wing-cafes smooth; antennæ rufous at the base. Inhabits Europe. Degeer. Gmelin.

CARABUS versicolor. Brassy, body ovate and short, brassy-black above, beneath black; thorax convex; wing-cafes smooth; antennæ rufous at the base. Inhabits Europe. Degeer. Gmelin.

CARABUS substriatus. Shining black; shells slightly striated, with four impressed dots. Inhabits Europe. Degeer. Gmelin.

CARABUS Pensylvanicus. Reddish-brown; head dusky; wing-cafes striated; body beneath, legs, and antennæ testaceous. Degeer. Inhabits Europe.

CARABUS halensis. Black; shells striated, and ferruginous towards the thorax; antennæ and legs testaceous. Inhabits Saxony. Schall.

CARABUS merens. Black; wing-cafes striated, and thorax rough and opaque. Inhabits Saxony.

CARABUS Schalleri. Black; smooth; wing-cafes with very minute punctured striæ.

CARABUS 8-striatus. Green, punctured; wing-cafes with eight striæ; legs pale. Inhabits France. Geoffr.

CARABUS nitidus. Shining-green; wing-cafes with eight striæ and three impressed dots; legs pale. Inhabits France. Geoffr.

CARABUS viridis. Green; wing-cafes with eight striæ, anterior part and margin fulvous. Inhabits France. Geoffr.

CARABUS nobilis. Black; thorax deep black; wing-cafes red, with a black cross. Inhabits France. Geoffr.

CARABUS ærugineus. Shining; head and shells green; thorax coppery, with twelve dots. Inhabits France. Geoffr.

CARABUS strigosus. Black, thorax ferruginous; wing-cafes striated, with four livid spots. Inhabits France. Geoffr.

CARABUS nigricollis. Entirely black; wing-cafes striated, with four livid spots. Inhabits France. Geoffr.

CARABUS 8-maculatus. Black, shells striated, with eight livid spots. Inhabits France. Geoffr.

CARABUS minutulus. Entirely black and smooth. Inhabits France. Geoffr.

CARABUS tenebrioides. Black, thorax broad; wing-cafes striated, with punctures. Inhabits France. Geoffr.

CARABUS laticollis. Entirely green; thorax broad. Inhabits France. Geoffr.

CARABUS fuscipes. Black, smooth; legs and base of the antennæ ferruginous. Inhabits France. Geoffr.

CARABUS spinipes. Piceous; thorax with an excavated longitudinal line; ends of the legs spinous. Inhabits Europe. Scopoli.

CARABUS elegans. Thorax linear, and as long as the shells; legs rufous. Inhabits Europe. Scopoli.

CARABUS cordatus. Thorax inversely heart-shaped. Inhabits Europe. Scopoli.

CARABUS junceus. Body somewhat linear; thorax narrowed behind. Inhabits Carniola and Helvetia. Scopoli.

CARABUS Scopoli. Brassy-green; wing-cafes testaceous, with the whole margin and band fuscous. Inhabits Carniola. Scopoli.

CARABUS salcinus. Black dotted; wing-cafes fuscous, striated; antennæ and legs ferruginous. Inhabits Carniola. Scopoli. Found on willows, &c.

CARABUS arenosus. Brassy-fuscous; thorax somewhat roundish, and dentated behind; legs rufous. Inhabits sandy places in Carniola. Scopoli.

CARABUS lucidus. Glossy-black; wing-cafes and legs testaceous. A small species, and inhabits Hungary. Scopoli.

CARABUS atomarius. Apterous, black, glabrous; wing-cafes edged with violaceous, smooth, and sprinkled with minute, confluent, violaceous dots. Mus. Lesk. Gmel.

CARABUS miliaris. Apterous, black; wing-cafes with elevated scattered dots; outer margins brassy-violet. Inhabits Europe. Lesk. Gmel.

CARABUS frausus. Apterous, black; wing-cafes ridged, the alternate ridges broken irregularly. Inhabits Europe. Lesk. Gmel.

CARABUS cypris. Apterous, black, and coppery; wing-cafes with four ridges each, containing three rows of elevated dots. Inhabits Europe. Lesk. Gmel.

CARABUS 5-lineatus. Black; thorax rounded, laterally truncated behind with an impressed dorsal line, and a double one on each side at the base; wing-cafes ridged, the five innermost joining the sixth at the tip. Inhabits Europe. Lesk. Gmel.

CARABUS tricolor. Ferruginous black; head, antennæ at the base, and thorax black; wing-cafes depressed, striated, tip truncated, and with the outer edge of the thorax ferruginous. Inhabits Europe. Lesk. Gmel. Obs. Antennæ cinereous and glabrous.

CARABUS confluent. Black; thorax rounded at the sides; wing-cafes striated, the first and eighth, second and seventh, united at the tip. Inhabits Europe. Lesk. Gmel.

CARABUS Leshii. Deep black; head and thorax black; wing-cafes brown, with silky striæ; antennæ and legs ferruginous. Inhabits Europe. Lesk. Gmel.

CARABUS trichrous. Black; antennæ and legs ferruginous; wing-cafes finely striated; head and thorax brassy, the latter with an impressed dorsal line, and two smaller on each side behind. Lesk. Gmelin makes three varieties of this species; namely, β *Carabus antennis basi rubris*. Lesk. γ *Carabus ater*. Lesk. δ *Carabus niger*. Lesk. All these inhabit Europe.

CARABUS pullus. Ferruginous black; wing-cases striated; antennæ rufous. Inhabits Europe. Lesk. Gmel.

CARABUS quadratus. Thorax nearly square, with an impressed dorsal line, and a smaller one on each side behind; wing-cases striated. Lesk. Gmel.

CARABUS plicatus. Black; thorax somewhat orbicular, and plaited on each side behind. Inhabits Europe. Lesk. Gmel.

CARABUS piceus. Piceous; wing-cases black and striated; thorax with an impressed dorsal line, and two smaller on each side behind, the inner one most elevated. Inhabits Europe. Lesk. Gmel.

CARABUS emarginatus. Black; thorax nearly square, and truncated behind; wing-cases striated and emarginated at the tip. Inhabits Europe. Lesk. Gmel.

CARABUS chalybeus. Black; head and thorax brassy; shells brassy-black, and striated, with greenish outer margin. Inhabits Europe. Lesk. Gmel.

CARABUS erythroceras. Black; thorax nearly square, and rounded at the sides; wing-cases striated; antennæ rufous; legs ferruginous. Inhabits Europe. Lesk. Gmel.

CARABUS concolor. Black; thorax nearly square; shells deep black, and very finely striated. Inhabits Europe. Lesk. Gmel.

CARABUS erythropus. Black; thorax square behind; wing-cases striated; antennæ and legs rufous. Inhabits Europe. Lesk. Gmelin speaks of a variety of this species with striae of dots on the wing-cases.

CARABUS crenatus. Black; wing-cases with crenated punctured striae. Inhabits Europe. Lesk. Gmel.

CARABUS distinctus. Above black, beneath ferruginous; thorax truncated behind. Inhabits Europe. Lesk. Gmel.

CARABUS rubicornis. Black, antennæ red; posterior part of the thorax truncated, with an impressed dorsal line. Inhabits Europe. Lesk. Gmel.

CARABUS punctulus. Black, with a row of minute dots on the shells. Inhabits Europe. Lesk. Gmel.

CARABUS bispinosus. Black; thorax truncated behind; anterior shanks thick, and two-spined. Inhabits Europe. Lesk. Gmel.

CARABUS erythromelas. Black, antennæ and shanks ferruginous. Inhabits Europe. Lesk.

CARABUS viridans. Greenish-black; antennæ and legs rufous; wing-cases striated with flat finely punctured ridges. Inhabits Europe. Lesk.

CARABUS multicolor. Black, head and thorax green; wing-cases bluish-green, with yellow down; mouth, base of the antennæ, and the legs rufous. Inhabits Europe. Lesk.

CARABUS obfuscatus. Fuscous, thorax truncated behind; wing-cases striated; antennæ and legs ferruginous. Inhabits Europe. Lesk.

CARABUS dolens. Black; wing-cases striated; shanks ferruginous. Inhabits Europe. Lesk.

CARABUS excisus. Ferruginous-glabrous; thorax truncated before and jagged behind; wing-cases striated. Inhabits Europe. Lesk.

CARABUS limbatus. Black; thorax margined, plaited behind; wing-cases striated; legs black-ferruginous. Inhabits Europe. Lesk.

CARABUS trunculatus. Black; thorax truncated behind; wing-cases striated; legs ferruginous-brown. Inhabits Europe. Lesk.

CARABUS chloromelas. Black, above green; antennæ and legs ferruginous. Inhabits Europe. Lesk.

CARABUS sinuatus. Black; wing-cases striated, and sinu-

ate at the apex; antennæ rufous at the base. Inhabits Europe. Lesk.

CARABUS pallidicornis. —Black; wing-cases striated; thorax truncated behind, outer margin, with the legs and antennæ, pale. Inhabits Europe. Lesk.

CARABUS aurichalceus. Brassy-black; antennæ and legs rufous. Inhabits Europe. Lesk.

CARABUS rotundatus. Black, above brassy; thorax rounded; wing-cases striated; shanks ferruginous. Inhabits Europe. Lesk.

CARABUS lituratus. Piceous; head, legs, and striated wing-cases testaceous, the last with a common black violet spot at the tip; thorax violet. Inhabits Europe. Lesk.

CARABUS cylindricus. Testaceous, cylindrical; head black; thorax orbicular and rufous. Inhabits Europe. Lesk.

CARABUS 4-notatus. Black, thorax orbicular; wing-cases blue-brown, with four testaceous dots; legs testaceous. Inhabits Europe. Lesk.

CARABUS 6-notatus. Brassy-black; thorax rounded; wing-cases striated, with three pair of impressed dots at the suture. Inhabits Europe. Lesk.

CARABUS fuscicornis. Black, above brassy; thorax rounded and punctured; wing-cases with crenated striae; antennæ brown; legs rufous. Inhabits Europe. Lesk.

CARABUS trispinosus. Black; head and orbicular thorax brassy; wing-cases ferruginous, brassy, and striated with punctures; legs rufous; thighs thick; shanks spinous. Inhabits Europe. Lesk.

CARABUS mafus. Ferruginous; thorax rounded; wing-cases striated; head brown; antennæ and legs testaceous. Inhabits Europe. Lesk.

CARABUS porphyropus. Piceous, thorax truncated; wing-cases striated; antennæ and shanks rufous. Inhabits Europe. Lesk.

CARABUS atratus. Black; thorax orbicular; wing-cases pale, varied with black; antennæ and legs ferruginous fuscous. Inhabits Europe. Lesk.

CARABUS lepidus. Above brassy-green, beneath bluish; thorax nearly square, with four impressed striae behind; anterior shanks dilated at the tip. Inhabits Europe. Lesk.

CARAC, KAREK, or CHAREDSI, in *Geography*. See KAREK.

CARACA, in *Botany*, Rumph. Amb. 5. p. 373. tab. 132. See *DOLICHOS bulbosus*.

CARACAL, in *Zoology*, an animal of the lynx tribe, by some called the Persian lynx. See *FELIS caracal*.

CARACALLA, in *Antiquity*, a long garment, having a sort of capuchin or hood a-top, and reaching to the heels; worn equally among the Romans by the men and the women, in the city and the camp.

Spartian and Xiphilin represent the emperor Caracalla as the inventor of this garment, and hence suppose the appellation *caracalla* was first given him. Others, with more probability, make the *caracalla* originally a Gallic habit, and only brought to Rome by the emperor above-mentioned, who first enjoined the soldiery to wear it. The people called it *Antoninian*, from the same prince, who had borrowed the name of Antoninus.

The *caracalla* was a sort of cassock, or surtout. Salmasius, Scaliger, and after them Du-Cange, even take the name *casaque* to have been formed from that of *caraque*, for *caracalla*. This is certain from St. Jerom, (epist. 128, ad Fabiolam,) that the *caracalla* which became an ecclesiastical garment, was a kind of cloak with a cowl; for both he, and Eucherius, (Instruction. l. ii. c. 10.), describing the

ephod, or sacerdotal garment of the Jewish priests, tell us, it was made "in modum caracallæ," after the manner of the caracalla, or monkish dress, "fed sine cuculla," but without a cowl. The garment of Amphibalus, a monk of Caerleon, which St. Alban put on when he suffered death, is called by Bede, and other ancient writers, caracalla, which is rendered by the Saxon interpreter of Bede, a monkish habit. Thomas Walsingham, (apud Usser Britan. Eccles. antiq. p. 78.), relates, that this garment was preserved in the church of Ely, in a large chest, which was opened in the reign of Edward II. A. D. 1314. The caracalla is described as made of several pieces cut and sewed together, and hanging down to the feet; but it is more than probable there were some made shorter, especially out of Rome, otherwise we do not see how it could have fitted the purposes of the soldiers.

CARACALLA, in *Biography and History*, a Roman emperor, was the son of the emperor Severus and Julia Domna, and born A. D. 183. At the age of eight years, his family name "Bassianus," which he derived from his maternal grandfather, was changed by Severus, on his becoming emperor, into the highly respected names of Marcus Aurelius Antoninus; conferring upon him at the same time the dignity of Cæsar, which title was confirmed to him in the following year, viz. A. D. 197, by a decree of the senate. By these names he chose to be distinguished; but his infamous conduct has caused his history to be transmitted to posterity under the nick-name of Caracalla, which was occasioned by his fondness for a Gaulish robe so called, (see the preceding article) worn by himself in preference to any other, and gratuitously distributed among his soldiers and the inhabitants of Rome, for their use. In his eleventh year, the emperor induced the soldiers, after the capture of Ctesiphon, to proclaim him "Augustus;" Geta his brother, receiving at the same time the title of Cæsar, and the name of Antoninus. The act of the soldiers was confirmed by the senate, and Severus recompensed them with liberal donations. Before he had completed his 14th year, the emperor, whilst he was at Antioch, prosecuting a war against the Jews, in which this youth had the title of commander, and for the successful issue of which the senate decreed him a triumph, gave him the manly robe, and made him his colleague in the consulship, A. D. 202. In the following year he married the daughter of Plautianus, the prætorian prefect, and an insolent favourite, whose abuse of the infamous power with which he was entrusted, brought him to an untimely end. Caracalla was instrumental in procuring the prefect's death, A. D. 205; and his hatred of the father was soon followed by an invincible dislike of the daughter, whom he had married against his inclination. To the ruin of Plautianus succeeded that of his family; for his son Plautus, and daughter Plautilla, were banished to the island of Lipari, where they languished in misery and perpetual alarms, till Caracalla, after he became emperor, ordered them to be killed. Caracalla and his brother Geta, who was declared "Augustus," and invested with the tribunitian power, A. D. 208, had conceived from their infancy an implacable hatred against one another. With a view of diverting their minds and allaying the animosity that subsisted between them, Severus took them with him in his expedition to Britain. But the ambition of Caracalla led him to avail himself of every opportunity that occurred for ingratiating himself with the officers and soldiers, and for inducing them to acknowledge him sole emperor in prejudice to his brother, whom he regarded as an odious rival. In order to hasten his attainment of the sovereign power, he even attempted to murder his father, whilst he was concluding a

treaty with the Britons, and receiving their arms. He afterwards intrigued with the officers and soldiers for the purpose of deposing him. Some have said, that during his last illness, Caracalla endeavoured to bribe the physician, who attended him, in order to hasten his death. Severus, who died at York, A. D. 211, was succeeded by his two sons, whom he had invested with the sovereign power during his life-time, and by his last will appointed to reign jointly after his death. The early antipathy that subsisted between the two brothers was invincible; and the intreaties, rebukes, and exhortations, both of their father and their preceptor Antipater, had been altogether ineffectual to their reconciliation. As soon as Severus had expired, Caracalla endeavoured to exclude his brother, by his influence with the army, from any share in the sovereignty: but the soldiers protesting that they would equally obey both the sons of Severus, as he had appointed both to succeed him, he was forced to acknowledge his brother partner in the empire, and to suffer the soldiers to take the usual oath of allegiance to each. After this ceremony, Caracalla concluded a shameful treaty with the Britons; and both the brothers, about the middle of summer, set out for Rome with their mother Julia, and the ashes of their deceased father. In the progress of their journey, Caracalla attempted to murder Geta; and this attempt increased their mutual animosity and jealousy to such a degree, that they afterwards marched with their separate guards, and with no less wariness than if they had been in an enemy's country; lodging constantly in different houses, and carefully watching the motions of each other. On their arrival at Rome, they were received with great solemnity: but the discord that prevailed, and that was every day increasing between the two princes, produced two contending factions; and it was therefore proposed to make a division of the empire between them. Geta, who loved a quiet life, consented, that if Caracalla would surrender Asia and Egypt, he would retire to Alexandria, or Antioch, and leave him in unmolested possession of the rest of the empire. But this scheme was defeated by their mother Julia. Towards the close of this year, Caracalla made another attempt to murder his brother during the feast of Saturn; and this outrage occasioned almost an open war between the two princes, and a great deal of bloodshed. In the following year, A. D. 212, he effected his purpose, on occasion of an interview which was proposed, with a view to their reconciliation; when some centurions whom he had placed in ambush rushing on Geta with their swords in their hands, and urged on by the monster Caracalla himself, dispatched him with many wounds, whilst he was seeking refuge in the arms of his mother, who in endeavouring to save him was herself also wounded. Having by this atrocious act made himself sole master of the empire, he conciliated the attachment of the army by the most extravagant donations, and by circulating reports, as well as by public declarations, that his brother was a traitor, and that he had slain him unwillingly in his own defence, he established his own power. In order to delude the soldiers and the people, and to gain credit to these unfounded pretences, he repaired to the camp of the prætorian cohorts, and prostrating himself upon the ground before the images of the tutelary deities, he offered up sacrifices of thanksgiving for his happy escape: justifying himself also by similar declarations to the senate, before which he appeared, surrounded with his guards, and armed with a cuirass, he obtained the approbation of that base and venal assembly. By artifices of this nature he succeeded in prevailing with the prætorians to declare him sole emperor, and Geta a public enemy. That Caracalla himself was active as one of the executioners in

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the assassination of his brother is not improbable, if we consider, that some years after this event, he consecrated in the temple of Serapis, at Alexandria, the sword which he had used in the murder of Geta. When the savage deed was perpetrated, he forbade his mother, by menaces against her life, even exhibiting any signs of sorrow on the occasion: and he actually put to death Fadilla, the only remaining daughter of Marcus Aurelius, for disobeying a similar injunction.

In order to conciliate the senate, he made an ostentation of clemency, by allowing all exiles to return to the city; and as he made no distinction between the innocent and the guilty, he thus filled Rome with multitudes of villains who had richly deserved the punishment inflicted on them. With a view of satisfying the public, Caracalla permitted the memory of his brother to be honoured, using at the same time this memorable expression, "Sit divus, dum not sit vivus," i. e. "Let him be a god, as long as he is not alive;" and accordingly the senate issued a decree, by which he was enrolled among the gods. Notwithstanding these apparent but undistinguishing tokens of clemency, and this seeming respect for his deceased brother, Caracalla was rigorous and cruel in his conduct towards all those who manifested any respect for Geta, or who had any connection with him whilst he lived; and he adopted every method which he could devise for erasing the remembrance of him from the minds of survivors. Dion Cassius informs us, that in the general massacres of his partisans and friends, he ordered all his domestics, to the number of 20,000 persons, to be inhumanly put to death; it was death even to mention his name; and no one was allowed to use it even on the stage, where it was familiarly applied to slaves. All the money that bore his name was ordered to be melted down; and the inscriptions were erased. The dead bodies of those who were massacred were treated with indignity, burnt without ceremony, or were exposed to the beasts and birds of prey. Not satisfied with the murder of persons of inferior rank, Caracalla sacrificed to his rage and jealousy a great number of illustrious victims, among whom, Papinianus, the prætorian præfect, and the most eminent civilian in the opinion of Zosimus and Cujas, that ever lived, was the most distinguished. Papinianus had returned the confidence of Severus by faithful and zealous endeavours to promote union and concord between the two brothers; and having thus disgusted Caracalla, he was deprived of the post of prætorian præfect. But the immediate cause of his death was his laudable refusal to concur in furnishing Caracalla with apologies for the murder of his brother. "It is easier," he nobly replied, "to commit a parricide, than to justify it; and to accuse an innocent person is a second parricide." In short, no sex, rank, or age, escaped the cruelty of this monster of wickedness; and he seems to have equalled, or even exceeded Caligula in the indulgence of the most malignant passions. Indeed, in another respect he also resembled him, as a portion of real insanity seems to have blended itself with a temper and character radically and habitually vicious. His acts of rapine and extortion corresponded to those of his cruelty; and he seems to have made it his study through his whole reign to harass and oppress his people. Fond of public spectacles, he squandered with profusion in the support of these, what he extorted from the people; and his prodigality to the soldiers, with a view of engaging their affections, was unbounded. In games and shows he himself took an active part, fighting on occasions of this kind with wild beasts, and driving chariots in the circus. Whilst he indulged a taste altogether unsuitable to his high rank and office, and the meanest kind of curiosity and inquisitiveness, he despised every quality that

was likely to command esteem; and his ignorance, and his contempt of literature and of learned men, were notorious. His debaucheries were as detestable as his other bad qualities; and yet, with an unpardonable hypocrisy, he affected zeal for chastity and even for religion, though he forbade any one's calling him by the names of the divinities he worshipped: but his pretended piety was blended with a passion for the delusive arts of magic and judicial astrology.

Having established in the capital of his empire a character detestable for cruelty and oppression, and levelled the prerogatives of the Roman people by extending them to all the subjects of his empire, he determined to trace the footsteps of Alexander the Great, for whom he professed an extravagant veneration, in the path of military glory. Ambitious of resembling this conqueror in every circumstance of his history, he condescended to associate upon the most intimate terms with his soldiers, and to take part with them in all their military labours and exercises; and having thus fitted himself, as he conceived, for all the offices of a great commander, he left Italy, A. D. 213, and commenced his expeditions by visiting Gaul, where he exercised such cruelties that he was more hated and abhorred there than he had ever been at Rome. He afterwards crossed the Rhine, and conducted an expedition against the Catti and the Alemanni, now first mentioned in history; but he was obliged to purchase a peace with large sums, and the liberty of returning with safety into the Roman dominions. As soon as it was known in Germany that he had bought a peace of these people, all the nations inhabiting that extensive country flew to arms, and compelled him to grant them yearly pensions, the supply of which reduced him to the necessity of coining false money. In an interview with the Barbarians on this occasion, he was guilty of an act of perfidy, which of itself is sufficient to fix an indelible stain on his memory. Having ordered all the youth of Noricum to take arms, and join him, he commanded his troops to fall upon them and to put them all to the sword. For this pretended victory he assumed the title of "Alemannicus." From the borders of the Rhine he marched to the Lower Danube, and obtained some slight advantages over the Barbarians, then hardly known, but afterwards too intimately connected with the affairs of declining Rome, called by the Romans Geti, and in subsequent times Goths. Having made an alliance with the Dacians, he passed from the banks of the Danube into Thrace; and afterwards crossing the Hellespont, he arrived at Ilium, and paid singular honours to the memory of Achilles at his supposed tomb. The death of Festus, his favourite freedman, whom he is supposed to have poisoned, for the purpose which he proposed, furnished him with an opportunity of resembling Achilles in his funeral of Patroclus. Accordingly, he spared no expence in rendering the obsequies of Festus extremely pompous. From Ilium he went to Pergamus, to seek relief in the temple of Æsculapius, under the disorders of mind and body, of which he had reason to complain, and which were probably owing to the agitations of remorse and terror. Having spent the winter at Nicomedia, he prepared for attacking the Parthians and Armenians; but Artabanus was under a necessity, on account of the intestine divisions of Parthia, to avert the attack by a timely submission. By the basest perfidy, he made captives of Abgarus, king of Edessa, and the king of Armenia; but the only fruit which Caracalla reaped from his perfidy was the defeat of Theocritus, one of his generals, the consequent shame he so justly merited, and the universal distrust of all mankind. However, he possessed a soul incapable of feeling such humiliations; and therefore gloried in the success of his exploits, and wrote haughty and boastful letters

letters to the senate on the occasion, as Caligula had done before him. At Alexandria, whither he next went, he perfidiously availed himself of an opportunity that offered itself of avenging himself of the Alexandrians for some raileries which these volatile and sarcastic people had formerly thrown out against him. The measure he adopted for this purpose was the most horrible massacre which history records. Having declared his intention of rendering personal homage to the god Serapis, the Alexandrians received him with every possible token of respect. Upon his first entrance into the sacred temple, he sacrificed whole hecatombs, and burnt upon the altar a great quantity of incense. From thence he proceeded to the tomb of Alexander, and rendered peculiar honours to the deceased hero. All these specious and pompous appearances served, however, to conceal his black design of extirpating the inhabitants of Alexandria. In the midst of the festivities produced by the delusion he was practising, he directed, from his post in the temple of Serapis, his troops to fall on the assembled inhabitants and to make an undistinguished slaughter. Many thousands of natives and strangers fell in the carnage, and an universal pillage succeeded, which, with the severities that followed this horrid massacre, reduced their flourishing capital almost to a state of desolation. This desolation, however, was but a temporary evil; for Caracalla not long surviving, Alexandria recovered its splendour by its own resources, and soon became again the second city of the empire. Caracalla having completed his purposes of vengeance at Alexandria, determined to proceed towards Parthia; and making Artabanus's refusal to give him his daughter in marriage a pretext for violating the peace which had been concluded between the empires, he ravaged a large tract of country, plundered the cities, and after overrunning all Media, drew near the royal capital, where, like a dastardly enemy, he vented his fury even upon the dead, opening the tombs of the Arsacidæ, and scattering their ashes to the wind. Upon his return to Mesopotamia he boasted that he had conquered the Parthians, whom he had not even seen, and in his letters to the senate and Roman people, he pretended that he had subdued all the East, and obliged every country beyond the Euphrates to acknowledge their laws. In consequence of these pretences, he obtained from the senate the appellation of "Parthicus," and a decree for a triumph. The war would have been furiously renewed if a domestic conspiracy had not put an end to the miseries inflicted on the world by this detestable tyrant. M. Opilius Macrinus had risen from a low station to the post of prætorian præfect; but he had incurred the jealousy and hatred of Caracalla, whose suspicion was increased by the prediction of a diviner, that he was to succeed him on the throne. The circumstances of Macrinus were become critical, in consequence of some dispatches from Rome, which accidentally fell into his hands; and in order to evade the stroke which was meditated against him, he employed a discontented centurion, named Martialis, to assassinate the emperor. Accordingly, whilst he was pursuing his journey from Edessa, where he had wintered, to Carrhæ, for the purpose of offering a sacrifice in the temple of the Moon, a call of nature obliged him to alight: Martialis seized the opportunity, when he was almost alone, to dispatch him with a dagger. The assassin instantly fled; but he was pursued, overtaken, and slain by some of the emperor's attendants. Thus perished Caracalla on the 8th of April, A.D. 217, at the age of 29 years, and after a reign of six years, two months, and six days. His death was regretted by the soldiers; who demanded that he should be ranked among the gods. His successor Macrinus treated as a god, a prince

whom he had been instrumental in killing; and the senate, by his orders, decreed him divine honours. Thus, this monster, detested by heaven and earth, had his temple, his priests, and festivals, established for the worship of him at Rome. The authors who lived under Caracalla were Q. Severus Sammonicus, murdered by his order; Ælius Maurus, and Oppian. The principal historians of this period are Herodian, Dion Cassius, and Spartian. Crevier's Hist. of the Emperors, vol. viii. Anc. Un. Hist. vol. xiii.

CARACALLA, in *Botany*. See PHASEOLUS *Caracalla*.

CARACARA, in *Ornithology*, the name under which Buffon describes the Brazilian kite. See *FALCO Brasiliensis*. The same name caracara has been also given to the gold-breasted trumpeter, *PSOPHIA Crepitans*, which see.

CARACARAS, in *Zoology*, a species of snake. See COLUBER.

CARRACCA, LA, in *Geography*, a sea-port town of Spain, in the province of Andalusia; two leagues E. of Cadiz.

CARACCAS, a district of Terra Firma in South America, belonging to the Spaniards. It lies between the province of Venezuela to the west, and that of Cumana to the east, and is bounded on the north by the Caribbean sea, and on the south, by parts of America little known. The coast is rocky and mountainous, but its vallies and plains are fertile, and produce the cacao-tree, indigo, sugar, and tobacco. The air is reckoned clear, and the climate wholesome. Its principal towns are Caraccas, the capital, and Porto Cavallo, which is a sea-port town. In consequence of the acknowledged superiority of the cacao nuts in this province, and its communication with the Atlantic which facilitates the conveyance to Europe, the culture of the cacao there is more extensive than in any district of America. However, the Dutch, by the vicinity of their settlements in the small islands of Curaoa and Buen-Ayre, to the coast of Caraccas, gradually ingrossed the greatest part of the cacao-trade. Hence the traffic with the mother country ceased almost entirely; and such was the supine negligence of the Spaniards, or such were the defects of their commercial arrangements, that they were obliged to receive from the hands of foreigners this production of their own colonies, at an exorbitant price. In order to remedy an evil no less disgraceful, than pernicious to his subjects, Philip V. in 1728, granted to a body of merchants an exclusive right to the commerce with Caraccas and Cumana, on condition of their employing at their own expence, a sufficient number of armed vessels to clear the coast of interlopers. This society, sometimes distinguished by the name of the company of Guipuscoa, from the province of Spain in which it was established, and sometimes by that of the company of Caraccas, from the district of America to which it trades, has carried on its operations with such vigour and success, that Spain has recovered an important branch of commerce, which she had suffered to be wrested from her, and is plentifully supplied with an article of extensive consumption at a moderate price. From this institution the colony, as well as the parent state, has derived great advantage. The planters in the Caraccas are not left to depend entirely on the company either for the importation of European commodities, or the sale of their own productions. The inhabitants of the Canary islands have the privilege of sending thither annually a register ship of considerable burden; and from Vera Cruz in New Spain, a free trade is permitted to every port comprehended in the charter of the company. Hence arises a competition which tends to fix the price of all commodities, both purchased and sold, at its natural and equitable rate. The company has not the power of raising the former or degrading the latter

latter at pleasure; and accordingly, since it was established, the increase of culture, of population, and of live stock, in the province of Caraccas, has been very considerable. During twenty years, prior to the establishment of this company, only five ships sailed from Spain to that province; and during 16 years, from 1706 to 1722, not a single ship arrived from Caraccas in Spain. Before the erection of the company, neither tobacco nor hides were imported from Caraccas into Spain. But since the commercial operations of the company began, in the year 1731, the importation of cacao into Spain has very much increased. The company at first employed twelve vessels to carry on its trade, with nineteen to guard the coast from smugglers, varying these numbers as suited their convenience, and for both these purposes they engaged 2500 seamen. The ports they used in Spain were St. Sebastian and Cadiz. During thirty years subsequent to 1701, the number of "fanegas" (each 110 pounds) imported from Caraccas was 643,215. During eighteen years subsequent to 1731 the number of fanegas imported was 869,214. And if we suppose the importation to be continued in the same proportion during the remainder of 30 years, it will amount to 1,448,746 fanegas, which is an increase of 805,531 fanegas. During eight years subsequent to 1756, there have been imported into Spain by the company 88,482 "arobas" (each 25 pounds) of tobacco and hides to the number of 177,354. During five years subsequent to 1769, it has imported 179,156 fanegas of cacao into Spain, 36,208 arobas of tobacco, 75,496 hides, and 221,432 pesos in specie. In return for the cacao with which it supplies Mexico, it receives cash, which is either remitted to Spain or laid out in purchasing European goods. The quantity of cacao raised in the province is double of that which it yielded in 1731; the number of its live stock is more than treble, and its inhabitants much augmented. The revenue of the bishop, which arises wholly from tithes, has increased from 8000 to 20,000 pesos; the price of cacao has decreased from 80 pesos for the fanega to 40. Guiana, including all the extensive provinces situate on the banks of the Orinoco, the islands of Trinidad and Marguerita, are added to the countries with which the company of Caraccas had liberty of trade by their former charters; and in 1752 their grant was extended to the province of Maxacaybo. However, in many of the operations of this company, the illiberal and oppressive spirit of monopoly has been conspicuous, and has prevented the company from deriving all the beneficial effects, which their constitution was adapted to afford them. In 1780 this company received a very severe stroke in the capture of a rich convoy by Lord Rodney, valued at more than 20,000l. and a few years after their capital was absorbed in a new establishment, called the *Company of the Philippines*; which see. Robertson's *America*, vol. iii. Townsend's *Journey through Spain*, vol. ii.

CARACCAS, or LEON DE CARACCAS, the capital of the district above described, situated in a plain some leagues from the sea, from which it is separated by mountains, and rendered difficult of access: and containing about 24,000 inhabitants. It is the residence of a governor, and carries on a considerable trade. Its port, named "Guayra," though it has bad anchorage, is improved by the construction of a mole. N. lat. 10° 30'. W. long. 66° 26'.

CARACCAS, *Silla de*, a mountain on the coast of South America, in the province of Venezuela, 1316 toises in height. There is a dreadful perpendicular precipice of 1300 toises in this mountain, above Caravalledo; the northern part of this chain being perhaps broken by the gulf of Mexico.

CARACCI, LUDOVICO, in *Biography*, an eminent painter of history, landscape, and portrait, was born at Bologna

in 1555, became a disciple of Prospero Fontana, and acquired his distinguished reputation by studying the works of Titian, Tintoretto, and Paolo Veronese, at Venice, and of Parmigiano and Corregio at Parma. With less fire in his compositions than Annibal or Agostino, he surpassed them in grace, dignity, and sweetness; and particularly in religious subjects he excelled them both. "Simplicity and elegance distinguished all his designs; his touch was lively, his expression good; the hairs of his heads are graceful; his figures are marked with a fine outline; and his composition is often sublime." "He was," says Mr. Fuseli, "the sworn pupil of nature." "To a modest, but dignified design, to a simplicity eminently fitted for those subjects of religious gravity which his taste preferred, he joined that solemnity of hue, that sober twilight, that air of cloistered meditation, which has been so often recommended as the proper tone of historic colour." Whenever he courted elegance, which was seldom the case, he did it with enviable success. His master-piece in oil is the altar-piece of John the Baptist, now in the Louvre. This artist died in 1619. Pilkington.

CARACCI, *Agostino*, the elder brother of Annibal and the disciple of Ludovico, was born at Bologna in 1558; and having first studied his art in the school of Prospero Fontana, he afterwards became the disciple of Passerotti, but he laid the foundation of his eminence under the direction of his kinsman Ludovico. He assisted Annibal in the Farnesian gallery, but less assiduous than his brother, he devoted much time to engraving, which he had learned from Cornelius Cors. "He combined," says Mr. Fuseli, "with some learning, a cultivated taste, correctness, and sometimes elegance of form, and a corregiesque colour, especially in fresco." The most celebrated picture of this master is the communion of St. Jerom, now at the Louvre, which has been often compared with its rival picture of the same subject by Domenichino. "These two pictures," says Mr. Fuseli, "have often been compared without much discrimination of the principles that distinguish either, and the result has commonly been in favour of Domenichino; but surely, if Agostino yields to his scholar in repose, and the placid economy of the whole, he far excels him in the principal figure, the expression and character of the saint." Agostino died in 1602. Pilkington.

CARACCI, *Annibal*, an eminent painter of history, portrait, and landscape, was born at Bologna in 1560, and being a disciple of his cousin-german, Ludovico Carracci, he imbibed from him the best principles of his art, as well as an ambition to arrive at perfection in the exercise of it. With this view he studied the works of Titian, Tintoretto, and Paolo Veronese, at Venice, and those of Corregio at Parma. At an early age he manifested proofs of an extensive genius, which not only surprised the artists of his time, but excited a general expectation of the excellence to which he attained. The fame of the Carraccis having reached to Rome, Annibal was invited thither by the cardinal Farnese, and employed in painting the gallery which bears his name. But though he laboured ten years at this work, the avaricious ecclesiastic presented him with only 500 crowns. At Rome he had an opportunity of observing the antique statues, the basso-relievos, and also the compositions of Raphael, and he was thus led to abandon his Bolognese manner, formed after that of Corregio, and to adopt another more learned, but more dry and less natural, both in design and in colouring. There is a sameness in the manner of all the Carraccis; and the only difference between them is that which results from their diversity of temper and disposition. Annibal had more fire, boldness, and singularity of thought than the two others; and

and his designs were more profound, his expression more lively, and his execution more firm. His genius was better adapted to poetical and profane, than to sacred subjects; though, when he attempted the latter, he generally succeeded. His talents were admirably formed for landscape: the forms of his trees are grand; and in representing objects after nature, he gave them a character that distinguishes them strongly. He is said to have been deficient, however, in his knowledge of the principles of the chiaro, nor are all his local colours commendable: but upon the whole, no painter seems to have been more universal, more easy, more certain in every thing he did, nor more generally approved than Annibal. "Annibal," says Mr. Fuseli, "though superior to his cousin and brother in power of execution and academic prowess, was inferior to them in taste, sensibility, and judgment; in proof of which he adduces the master-work of Annibal, viz. the Farnese gallery; "a work whose uniform vigour of execution nothing can equal but its imbecility and incongruity of conception; if impropriety of ornament were fixed by definition, the subjects of that gallery might be quoted as the most decisive instances; the man of sense may admire the splendour, the exuberance, the concentration of powers displayed by Annibal de Caracci, but the man of sense must lament their misapplication in the Farnese gallery." He died in 1609. Pilkington.

The three Carraccis, of each of whom we have above given a brief account, laid the foundation of that school which has been highly celebrated by the title of the academy of the Caraccis. Young men, who aspired to be great masters, resorted hither for instruction; and they were furnished with well chosen models of men and women, fine casts from the best figures, from antique statues, and curious basso-relievos; as well as the most capital designs of the great masters, the most instructive books pertaining to the art, and the lessons of a very noted anatomist, who taught whatever it was necessary to know, concerning the knitting of the bones, and the insertion of the muscles.

Among the number of the excellent artists that were formed in this academy, were Guido, Domenichino, Albano, Lanfranc, Guercino, and many others. Pilkington.

CARACCIOLI, ROBERT, a famous preacher, was born in 1425 of a noble family at Lecce in the kingdom of Naples. In early life he entered into the order of Minor Observantines, and before his 30th year he acquired such reputation for pulpit eloquence, that Pope Nicholas V. dispensed with his obedience to his superior, and allowed him to dispose of himself at pleasure. Hence it has been said that he was less famous for sanctity of manners than for eloquence. After having been employed in several honourable commissions by the popes Calixtus III. and Sixtus IV. he became first bishop of Aquino, and afterwards of Lecce, where he died in 1495. As a preacher he was highly admired, and regarded as a model, with respect to tone, gesture, and manner, to all the young orators of his time. His sermons, which were adapted to a rude age, and which possess few graces of style, have been collected at different times; but most of them are contained in an edition at Venice, 3 vols. 1490, and at Lyons in 1503. Tiraboschi.

CARACHABAN, in *Geography*, a town of Persia, in the province of Adirbeitzan; 80 miles W. of Tauris.

CARACO, in *Zoology*, an animal of the rat kind, nearly allied to the Great or Norway rat, described by Dr. Pallas as a native of Siberia. See *Mus caraco*.

CARACOL, in *Architecture*, is sometimes used for a stair-case in the form of a helix or spiral.

CARACOL, in *Geography*, a town of South America, between Guayaquil and Quito.

CARACOL, in the *Manege*, a motion which a cavalier makes half round; or a half-turn from left to right; changing hands: that his enemy may be uncertain on which side he intends to attack; whether in front or flank. The word comes from the Arabic *garagol*, and that from the Hebrew *carac*, *involvere*: but we have it immediately from the Spanish, where caracol signifies properly a *snail*, and figuratively the evolution described above.

CARACOL, in *Military Language*, is the half-turn each horseman in an army makes after his discharge, to pass from the front of the squadron to the rear.

CARACOL is also a sort of half wheel, or semicircular movement not only by one horseman, but by a whole troop of cavalry, by means of which they perform a sort of winding, or serpentine motion, alternately on their right and on their left, in advancing towards the enemy. The object of this movement, or of the *caracol*, is to disquiet or annoy the enemy, to throw him into disorder or confusion, to conceal from him your intended point of attack, to induce him to divide or break, by distracting his attention, and to seize the favourable moment of falling upon him with advantage. The light horse are peculiarly calculated for this kind of manœuvre and attack. Velocity, indeed, is the principal excellence and very life of cavalry.

CARACOLI, in *Commerce*, a factitious metal whereof the natives of the Caribbee islands make a kind of ornament, in form of a half-moon, which is called by the same name. The metal is brought from the Terra Firma; and the common opinion is, that it is composed of gold, silver, and copper; but the mixture is so perfect, that a metal results from the whole which never rusts nor tarnishes, how long soever kept, either in the sea or the ground. The English and French goldsmiths have made frequent attempts to imitate it. Those who have succeeded best, use six parts of silver, three of purified copper, and one of gold. But the curious find all the imitations much inferior in beauty to the original metal of the savages.

M. Hauterive, procurator-general of Martinico, makes the caracoli to be a compound of gold only with a sort of copper found in the Terra Firma of America. F. Labat takes it for a native, or simple metal. The Americans also make rings, buckles, cane-heads, and the like, of caracoli.

CARACOMBO, in *Geography*, an African island, situated about 15 miles N. of the line, at a short distance N.W. of the island of St. Thomas, and a little above the mouth of the river Gabon. It produces a variety of fruits and plants peculiar to itself, besides birds and animals. It is not uncommon to find a hundred nests of birds floating on the water upon one branch of a tree, or a slender twig, thus guarding themselves against the attacks of serpents and lizards. The island is inhabited, as it is said, by an abandoned, profligate race both of men and women. The latter in particular are so lewd that they are said to prostitute themselves without discrimination and without shame.

CARACORES, in *Sea Language*, denote light vessels used by the natives of Borneo, and the adjacent islands, and also by the Dutch as guarda-costas in those latitudes. They are high at each end, and chiefly navigated with paddles, in the use of which they fit both within and without board, on narrow platforms of reeds, supported by bars rigged out across the vessel, and one at the outer end on each side, which serve as balances to prevent the vessel from upsetting. By placing three or four ranks of reeds on the platform of reeds

reeds outside, and some within, they can multiply their number so as to proceed with great velocity. They have triple sheers of bamboo for a mast, supported by shrouds, on which is hoisted an oblong sail, bent to a sort of bamboo yard at the head, and a boom at the foot. The sail is hauled aft by a sheet, the yard has a bowline to keep to windward, and a brace or vang that leads aft. The sail rolls up or furls by a winch at the end of the boom. See *Plate of Boats*.

CARACORUM, or HOLIN, in *Geography*, a Tartar village, the position of which is marked, in the map of M. D'Anville and the Chinese Itineraries, about 600 miles to the north-west of Pekin. This village was gradually ennobled by the election and residence of the sons and grandsons of Zingis. It contained two streets, the one of Chinese mechanics, the other of Mahometan traders; and the places of religious worship, one Nestorian church, two mosques, and twelve temples of various idols, represent in some degree the number and division of inhabitants. However, a French missionary declares, that the town of St. Denys, near Paris, was more considerable than the Tartar capital, and that the whole palace of Mangou was scarcely equal to a tenth part of that Benedictine abbey.

CARACT, or CARAT, in *Commerce*, a denomination given to an imaginary weight, which expresses the degree of goodness, fineness, and perfection, or imperfection of gold. The whole mass is conceived to be divided into twenty-four equal parts, i. e. twenty-four carats; and the purity of the specimen is expressed by the number of carats of pure gold it contains. Thus gold of eighteen carats fine means a compound of $\frac{18}{24}$ ths of pure gold, and $\frac{6}{24}$ ths of some other metal: gold of twenty-two carats fine contains $\frac{22}{24}$ ths of pure gold, and $\frac{2}{24}$ ths of alloy; and pure gold is called gold of twenty-four carats fine.

The word is also written *carraat*, *carraat*, *karraat*, and *karraat*. Its original is contested: but we choose to follow Kennet, who derives it from *careta*, a term which this author observes anciently denoted any weight, and came not till of later days to be appropriated to that which expresses the fineness of gold, and the gravity of diamonds. Others, however, derive it from the Arabic "kirat," which weighed half of a "danek," or grain; of which six made up the "dirhem," or Arabic drachm; so that twelve "kirats" were equal to a "dirhem." See the next article.

The mint-men fix the highest purity and perfection of gold at twenty-four carats; and the several degrees are estimated from the divisions hereof, which are called *grains*: but it is to be observed, that what care soever is taken in purifying gold, to clear it from dross, it can never be brought to twenty-four carats; but still comes short, at least $\frac{1}{4}$ of a carat, or a grain; this grain they call a sixteenth; and this sixteenth they subdivide into two eighths; and each of those eighths into two sixteenths: on which calculation, they say, gold may be purified as far as the first sixteenth of the second eighth, but no further. Gold of twenty-two carats, is that which has twenty-two parts of fine gold, and two of silver, or other metal; or that which, in refining, loses two parts in twenty-four of its weight. The goldsmiths generally work in gold of twenty-two carats; that being the standard gold of this kingdom. By the laws of France they are prohibited from working in gold below twenty-three carats. In England, the carat is divided into four grains; in Germany, into twelve parts; and in France, into thirty-two. The Chinese reckon by touches, a hundred of which correspond to our twenty-four carats. *Carat fine*, as above, is the twenty-fourth part of the goodness of a piece of pure gold. *Carat price* is the twenty-fourth part of the value of an ounce

or mark of gold.—They also sometimes say, the *carat weight*, which is the twenty-fourth part of the weight of the ounce or mark. Two troy grains make a carat grain.

CARACT is also the weight used in weighing diamonds, pearls, and precious stones; where it consists of four grains. In this sense, the word is by some supposed to be derived from *καρπύριον*, a fruit which the Latins call *siliqua*, and we *carob bean*; each of which may weigh about four grains of wheat: whence the Latin *siliqua* has also been used for a weight of four grains. Bruce, (Appendix to his Travels in Abyssinia, p. 66.) deduces it from the name of the bean of the Kuara-tree, which is called "Carat." From the gold country in Africa it passed, as he supposes, to India; and there came to be the weight of precious stones, especially diamonds.

The carat by which jewellers estimate the weight of diamonds and pearls, is about $\frac{1}{150}$ of a troy ounce. Jeffreys on Diamonds.

Hence the carat is about $3\frac{1}{2}$ grains troy.

Carats are divided into halves, quarters, or grains; and farther, into eighths, sixteenths, and thirty-two parts. *Id. ibid.*

CARACTACUS, in *Biography* and *British History*, one of the most renowned of the British kings.

Among the proud defenders of our ancient liberty, scarcely any one seems entitled to such ample notice as Caractacus, the victory over whom was acknowledged even by the conquerors of the world to have been one of the most important for the complete reduction of Britain that had ever been obtained.

What were the circumstances of his early years, or whether his education at all differed from that which was usually bestowed upon his countrymen, we have no means to ascertain. The earliest account we hear of him is in the reign of Claudius, when Aulus Plautius, the first Roman general who landed on the island after Julius Cæsar, commanded the expedition against Britain. The Roman commander, it appears, was unopposed at his landing, and having passed through the British states upon the coast without resistance, pushed forward through the country in quest of those who were in arms. This was in the year 43, when, by the direction of his guide, he first overtook and defeated Caractacus.

The spirit of this illustrious chief, however, was not to be subdued at once: and though, in the progress of the Roman arms immediately subsequent to this transaction, we hear but little of Caractacus, we are not to suppose he was otherwise employed than in inspiring his countrymen with the thoughts of vengeance.

Four years after Caractacus had lost the greater part of his dominions Aulus Plautius was recalled. The affairs of the island were left in the hands of the legates or commanders of the legions; and in the interval which occurred till the appointment of Ostorius Scapula as governor, A. D. 50, the Britons were enabled to gain some few advantages. Ostorius having restored the tranquillity of the Roman province in the south-east parts of Britain, marched against the Ceangi, who inhabited Cheshire, and part of Lancashire, opposite to Ireland: but was soon recalled by the intelligence of an insurrection among the Brigantes. It was not long, however, before he was called to encounter more determined enemies. These were the Silures, (who occupied Herefordshire, Radnor, Brecknock, Monmouth, Glamorgan, and, in general, *South Wales*), a people naturally brave and fond of liberty, but who, at that juncture, were rendered not only more confident and bold in themselves, but more formidable to their enemies by the valour of their leader. Caractacus, who, as we

have already mentioned, had lost the greatest part of his own dominions, willingly put himself at the head of this brave people, to make another effort for the deliverance of his country. He was skilled, we are told, in all the wiles and stratagems of savage warfare; and in point of local knowledge had greatly the advantage of the Roman general. And of this last, indeed, he availed himself by transferring the war into the country of the Ordovices, and by choosing a place for the field of battle, which was every way favourable to his own army, and incommensurable to his enemies. The spot he chose, in Shropshire, near the confluence of the Colun and Tame, is still called *Caer Caradoc*, and will be described under the head of CASTLE. Its ramparts and entrenchments are yet visible: and it exactly answers the description given by Tacitus. It was situated on the ridge of a steep mountain. In some places where the sides were accessible he fortified it with massy stones, heaped together in the form of a rampart. At the foot of the mountain flowed a river with fords and shallows of uncertain depth. And a host of men guarded his entrenchments.

The Roman general, observing the deepness of the river, the ruggedness of the mountain, the strength of the ramparts, and the loud alacrity of the enemy, was a little dismayed at such a succession of dangers. As long, says Tacitus, as they fought with missile weapons, the Britons had the advantage. But when Ostorius ordered his men to advance under a military shell, and level the pile of stones that served as a defence to the enemy, a close engagement followed. The Britons, unable to sustain the shock, retired slowly towards the ridge of the mountain, and were eagerly followed by the Romans. In short, the Britons, being without defensive armour, the legions and auxiliaries made prodigious havoc; and the victory, at last, became decisive. The wife and daughter of Caractacus were taken prisoners; his brother surrendered at discretion; and he himself fled for protection to Cartismandua, the queen of the Brigantes. But adversity, says the Roman historian, has no friends. Cartismandua, who was his step-mother, loaded him with irons, delivered him to the conqueror, and he, with his whole family, were carried prisoners to Rome. Even there the name of Caractacus was in high celebrity: and curiosity was eager to behold the hero who, for nine years, had made a stand against the Roman arms. The emperor too, proud of his prisoner, bestowed the highest praise on the valour of the vanquished king; he determined to render his entry into Rome as solemn and public as possible; and the people were summoned to behold the spectacle as worthy of admiration. The followers of the British chief, we are told, walked in procession. The military accoutrements, the harness and rich collars, which he had gained in various battles, were displayed with pomp. The wife of Caractacus, his daughter, and his brother, followed next: he himself closed the melancholy train. The rest of the prisoners, struck with terror, descended to mean and abject supplications. Caractacus alone was superior to misfortune. With a countenance still unaltered, not a symptom of fear appearing, no sorrow, no condescension, he behaved with dignity even in ruin; and being placed before the tribunal delivered himself in the following manner:

"If, to the nobility of my birth, and the splendour of exalted station, I had united the virtues of moderation, Rome had beheld me, not in captivity, but a royal visitor and a friend. The alliance of a prince, descended from an illustrious line of ancestors—a prince, whose sway extended over many nations, would not have been unworthy of your choice. A reverse of fortune is now the lot of Caractacus. The event to you is glorious, and to me humiliating. I

"had arms, and men, and horses; I had wealth in abundance: can you wonder that I was unwilling to lose them? The ambition of Rome aspires to universal dominion: and must mankind, by consequence, stretch their necks to the yoke? I stood at bay for years: had I acted otherwise, where, on your part, had been the glory of conquest, and where, on mine, the honour of a brave resistance? I am now in your power: if you are bent on vengeance, execute your purpose; the bloody scene will soon be over, and the name of Caractacus will sink into oblivion. Preserve my life, and I shall be to late posterity a monument of Roman clemency."

Claudius, it is enough to say, charmed with the boldness of his prisoner, pardoned both Caractacus and his family. The subsequent events of the British chieftain's life had no historian to pen them. And here we are obliged to close his history.

The speech of Caractacus, which is here translated literally from Tacitus's Annals, was finely used by Mr. Mason, in his celebrated dramatic poem. For the sake of epifodical incidents, however, he has departed from the strict line of historical truth: and has transferred the honour of taking Caractacus prisoner, and sending him to Rome, from Ostorius to Aulus Didius. Tacit. Annal. l. xii. c. 35, et seq.

CHARACTERE, *Fr.* as a dancer, *à demi-caractère*, in a style neither grotesque nor *terre à terre*; neither wholly comic nor serious.

CARADIVA, in *Geography*, an Asiatic island, near that of Ceylon, at the western point of the kingdom of Jafnapatan: called by the Dutch *Amsterdam*.

CARAGA, in *Ancient Geography*, *Rugga*, a town of Africa, 2 leagues S.S.E. of Tidus, mentioned by Ptolemy.

CARAGACH, in *Commerce*, a cotton that comes from Smyrna, by the way of Marseilles.

CARAGANA, in *Botany*, (from *cara-caragan*, the Tartar name). Lam. Encyc. Juss. 358. Vent. iii. p. 409. Class and Order, *diadelphia decandria*. Nat. ord. *Papilionaceae*, Linn. *Leguminosae*, Juss.

Gen. Ch. *Cal.* one-leaved, bell-shaped-cylindrical, deeply divided on one side, with five short teeth. *Cor.* papilionaceous; standard egg-shaped, half erect; the sides folded upwards; wings oblong; keel straight, oblong, obtuse. *Stam.* filaments ten, diadelphous. *Pist.* germ superior, oblong, smooth; style straight; stigma smooth, truncate. *Peric.* legume oblong, inflated, smooth. *Seeds* four to six, egg-shaped, a little globular, not compressed.

Ess. Ch. *Calyx* five-toothed. *Stigma* smooth, truncate. *Legume* oblong, almost cylindrical. *Seeds* nearly spherical. La Marck has formed this genus for some plants which Linnæus referred to robinia, but which differ from its genuine species, both in the fructification and general habit. Their stigma is smooth, not downy; their legume nearly cylindrical, not compressed, and their seeds not flattened, as in robinia. Their leaves, moreover, are generally abruptly pinnated, and the petioles often elongated, terminating in a thorny point.

Sp. 1. *C. arborescens*, (robinia caragana, Linn. Sp. Pl. Gmel. Sib. iv. 17. n. 22. *Aspalathus arborescens*, pinnis foliorum cretioribus, Amm. Ruth. p. 210. Duham. Arb. p. 188. n. 3.) "Leaves with about five pairs of leaflets, downy; stipules thorny; peduncles simple, fasciculated. *Stem* rising to a tree, from six to ten feet high or more. *Branches* short, stiff. *Leaves* fasciculated; leaflets elliptical, green above, veined, and paler green beneath; common petiole lengthened into a spinous point, sometimes producing an

an odd leaf, but nevertheless evidently extended beyond it; stipules in the second year becoming a pair of short, spreading spines. *Flowers* yellow, scentless. *Legumes* an inch and half long, smooth, rather cylindrical, pointed. A native of Siberia. It grows best in a light, sandy soil, and is not injured by severe cold. Its leaves are good fodder for cattle, and are said to produce a blue colouring matter. 2. *C. macrophylla*, Lam. "Leaflets in six pairs, roundish, mucronate, smoothish; stipules spinose; peduncles simple, solitary." A shrub, two or three feet high. *Leaves* alternate, abruptly winged. *Flowers* yellow, axillary, solitary; peduncles rather long. A native of Siberia. 3. *C. ferox*, Lam. *Illustr. Pl.* 607. *fig.* 1. (*Robinia ferox*, Pall. *Roll.* 70. *tab.* 44. *Travels* iii. *app.* 752. *n.* 125. *tab.* E e, *fig.* 2, 3. *Germ.* vol. iv. *Pl.* 25. *p.* 397, French Translation. *R. spinosa*, Linn. *Sp. Pl.* *R. spinosissima*, Laxm. *Nov. Com. Petrop.* 15, 558. *tab.* 30. *fig.* 4.) "Leaflets oblong, narrow, mucronate; stipules and petioles spinose." A shrub about five feet high. *Branches* slightly angular. *Leaves* alternate, abruptly winged: leaflets in four or five pairs, a little channelled, rather enlarged towards the summit, ending in a small point; common petiole sharp-pointed, remaining after the fall of the leaflets, and becoming a permanent, woody, sharp thorn about two inches long, and marked with the scars of the fallen leaflets; stipules half-embracing the stem, membranous at their edges, ending in two sharp spines. *Flowers* yellow, nearly sessile, axillary, solitary, or in pairs; calyx smooth, oblong, or cylindrical. *Legume* an inch long, straight, smooth, acuminate. A native of Siberia and China. On account of its long, tough branches, and large strong thorns, it is well adapted to make an impenetrable hedge; and, as it is covered with flowers near the whole of the summer, is at the same time a very ornamental plant. It has the additional recommendation of being hardy, and able to bear the winters of our climate without injury. 4. *C. argentea*, Lam. *Ill. Pl.* 607. *fig.* 3. (*Robinia halodendron*, Pall. *Travels*, vol. ii. *p.* 471. *t. w.* German, vol. iii. *pl.* 6. *p.* 153, French Translation, Linn. *jun. Supp.* 330.) "Leaflets in about two pairs, oblong, mucronate, wavy, covered with a silvery down; stipules and petioles spinose; peduncles three-flowered." A shrub, four or five feet high, covered in all its parts with a whitish down, which gives it a silky appearance. *Branches* numerous, spreading, angular, in consequence of three nerves proceeding from the base of each stipule. *Leaves* alternate; leaflets enlarged towards their summit; common petiole permanent, changing into a straight, sharp thorn, about an inch long; stipules short, recurved, spiny. *Flowers* reddish or purplish, sweet-scented, axillary, often six-petalled, owing to the wings being doubled. *Legumes* short, inflated, hard, remaining till the second year. A native of Siberia, in dry, naked, salt ground, near the river Irtysh. It flowers on its native soil in June, but has never produced flowers in our gardens, probably for want of the saline principle. Introduced by Dr. W. Pitcairn, in 1779. 5. *C. chamlagu*, (*Robinia chamlagu*, L'Herit. *Stirp.* Nov. 161. *tab.* 77. Aiton. *Kew.* iii. 54.) "Leaves in two pairs, petioled; pairs distant; stipules spinose; peduncles one-flowered." A handsome shrub, much-branched, quite smooth, four or five feet high. *Branches* spreading, angular. *Leaves* alternate, or fasciculated, two or three together on the knots of the old branches; common petiole ending in a short, spiny point, deciduous, a little after the leaflets, not becoming a thorn. *Flowers* large, yellowish, axillary. A native of China, where it is called *chamlagu*. Introduced by Mons. Richard, in 1773. 6. *C. digitata*, (*Robinia frutescens*, Linn. *Sp. Pl.* *Aspalathus frutescens major cortice aureo*, Amm. *Ruth.* *p.* 206. *n.* 283.) "Leaves on short petioles; leaf-

lets four, growing close together in a digitate manner; stipules somewhat spinose; peduncles one-flowered." A shrub, about three feet high, branched from the bottom. *Branches* rod-like, pliant, of a shining yellowish colour, angular, loaded with leaves and flowers. *Leaves*, on the shoots of the year, alternate, with spinose stipules; from the buds in bundles with unarmed stipules; leaflets clustered, inversely egg-shaped, attenuated at the base, ending in a small, sharp point; petiole very short, remaining after the leaflets, and hardening with the stipules into a triple spine. *Flowers* large, yellow, axillary; peduncle jointed near the middle. There is a variety with longer, narrower leaves, which La Marck supposes is the *robinia pygmaea* of Linnæus and Pallas, but observes that the leaves in his plant are not so very obtuse as Linnæus describes them. Linnæus allows that his *pygmaea* resembles the preceding, but says that it is of a dwarf stature, and more thorny. Both kinds were cultivated by Miller, who considered them as distinct. The Altaic plant, described by Pallas, is scarcely a span high in its native soil, but grows larger when cultivated in gardens.

CARAGAS, in *Geography*, a province of Mindanao, in the East Indies, situate on the eastern coast, between Suliago and the Cape of St. Augustin, which lie north and south. The seas on this coast are stormy. Caragas, as well as other parts of Mindanao, produces in great abundance that sort of palm-trees, which are called sagu, of the pith of which, reduced to meal, they make bread and biscuit through the whole island, and more especially on the coast of this province, near the river Butuan. The inhabitants of Caragas are a warlike people, and are accounted very brave, when employed either by sea or land.

CARAGI, in *Commerce*, a name given to duties paid at the custom-house in the territories of the grand signior, on the importation or exportation of goods. The term is also applied to the officers of the custom-house, who collect these duties.

CARAGLIA, in *Geography*, a town of Piedmont, in the province of Coni; $5\frac{1}{2}$ miles N.W. of Coni.

CARAGNA, or KARAGNA, in *Pharmacy*. See CARRANNA.

CARAGROUCH, a silver coin of the empire, weighing nine drams, which does not quite amount to a French crown, of three livres Tournois. At Constantinople it goes at 120 aspers. There are four sorts of them, equally current, and of the same value.

CARAGUATA, in *Botany*, Plum. *gen.* 10. See TILANDSIA.

CARAHISSAR, in *Geography*. See APHIOM KARRAHISSAR.

CARAIBES. See CARIBBEES.

CARAIGOL, CARIGUEYA, or CARIGUEIA, in *Zoology*, according to Marcgrave, Pisa, and some other authors, the Brazilian name of the Virginian opoffum. See DIDELPHIS *opoffum*.

CARAIPA, in *Botany*, Lam. *Enc. Jussieu* 434. Aubl. *Guiana* 561. a genus imperfectly known. Class and order, *polyandria monogynia*. *Cal.* Perianth deeply divided into five round segments. *Cor.* unknown. *Pist.* Germ. superior. *Peric.* Capsule somewhat woody, rather three-sided, acute, and recurved at its summit, three-celled, opening from the summit to the base with three permanent valves. *Seeds* one in each cell; angular on the inner, convex on the outer side, attached to a large three-winged receptacle, which uniting with the valves, forms the partitions of the cells.

Sp. 1. *C. parvisolia*, Aub. *tab.* 223. *fig.* 1. "Leaves egg-shaped, acute, white with down underneath." A tree from fifteen to twenty feet high, much branched near the top.

Branches reddish. *Leaves* alternate, petioled, entire; stipules two, opposite, caducous. *Flowers* in terminal clusters; capsules hairy. 2. *C. longifolia*, Aubl. tab. 223. fig. 2. "Leaves oblong egg-shaped, acute, grey underneath." A larger and higher tree than the preceding. *Leaves* eight inches long, and three broad. 3. *C. latifolia*, Aubl. tab. 224. fig. 3. "Leaves broad-egg-shaped, acuminate, ash-coloured underneath." 4. *C. angustifolia*, Aubl. tab. 224. fig. 4. "Leaves long, egg-shaped, acuminate, white underneath." *Leaves* with more numerous lateral nerves, ten inches long, and two and a half broad. All the species are found in the forests of Guiana. The second is called caripe by the natives.

CARAITES, or KARAITES, קראים, from קרא, *kera*, to read, a sect among the ancient Jews: whereof there are still some subsisting in Poland, Russia, Constantinople, Cairo, and other places of the Levant; though few or none are to be found in these western countries. About the middle of the 16th century, a particular account was taken of their number; which in Poland was 2000; at Caffa, in Crim Tartary, 12,000; at Cairo, 300; at Damascus, 200; at Jerusalem, 30; in Babylon, 100; in Persia, 600; amounting in the whole to 15,230, and being a small number compared with the Rabbinites. It is their distinguishing tenet and practice to adhere closely to the words and letter of the Scripture, (as their name imports) exclusive of allegories, traditions, and the like.

Leo of Modena, a Rabbi of Venice, observes, that of all the heresies among that people, before the destruction of the temple, there is none now left but that of the Caraim, a name derived from *micra*, which signifies the pure text of the Bible; because of their keeping to the Pentateuch, observing it to the letter, and rejecting all interpretations, paraphrases, and constitutions of the Rabbins. Aben Ezra, and some other Rabbins, treat the Caraites as Sadducees; but Leo de Juda calls them, more accurately, Sadducees reformed; because they believe the immortality of the soul, paradise, hell, resurrection, &c. which the ancient Sadducees denied. He adds, however, that they were doubtless originally real Sadducees, and sprung from among them.

M. Simon, with more probability, supposes them to have risen hence; that the more knowing among the Jews, opposing the dreams and reveries of the Rabbins, and using the pure texts of Scripture to refute their groundless traditions, had the name of Caraim given them; which signifies as much as the barbarous Latin, *Scripturarii*, i. e. people attached to the text of Scripture. The other Jews give them the odious name of Sadducees, from their agreement with those sectaries on the head of traditions. The real fact seems to have been, that the traditionary law was opposed, as a corruption of the true religion, by a numerous body, who strenuously asserted the sufficiency and perfection of the ancient written law, explained in its literal sense. Among these were the Sadducees. But it is very probable, that the Sadducean tenets were highly offensive to many pious men, who nevertheless were not disposed to join those who received the traditionary institutions. These, adhering simply to the letter of the Mosaic law, but at the same time refusing to adopt the doctrine of the Sadducees, would of course become a separate sect, which would be distinguished by some name expressive of their leading principle. It is not improbable that the opposite party gave them, in derision, the name of *Scripturists*, or *Caraites*. Hence we may conclude, that this sect arose at the same time with those of the Sadducees and Pharisees. From the Jewish records it may be inferred, that this sect existed in the time of Hyrcanus. Accordingly it has been said, that upon the dissensions between Hillel, the president of the Sanhedrim, and Shammai the vice-president,

about 30 years before Christ, their respective scholars formed two parties, and took different names. Those who adhered to Scripture only were called Caraim, or *Scripturarii*, and were followers of Shammai; and those who were zealous for the traditions taught by the Scribes, or Rabbis, were called Rabbanim, Rabbinites, and were followers of Hillel. The Caraites justly boasted the high antiquity of their principles, as being the followers of Moses and the prophets, in opposition to human tradition; but when the doctrines of the Rabbis were generally adopted among the Jews, the Caraites were considered as schismatics. Scaliger, Vossius, and Spanheim, erroneously, rank the Caraites among the Sabæans, Magi, Manichees, and Mussulmen. Wolfgang, Fabricius, &c. say, the Sadducees and Esseni were called Caraites, in opposition to the Pharisees: others take them for the doctors of the law so often mentioned in the gospel: and in favour of this conjecture, has been alleged a tradition preserved in the Jerusalem Talmud, that there were in Jerusalem 480 synagogues, each of which had a separate apartment for the law, and another for the Talmud, or traditionary records: whence it has been inferred, that the *Scripturists* were a party distinct from the Traditionaries. The Scribes, whose office it was to expound the law, from the manner in which they are usually mentioned in the New Testament, in conjunction with the Pharisees, may be concluded to have adopted, in their interpretations, the allegorical method of the Traditionaries and Cabbalists, and therefore to have commonly belonged to their party. Josephus and Philo make no mention of them; whence it has been inferred, that they were more modern than either of those authors. Perhaps, this sect was not formed till after the collection of the second part of the Talmud, or the Gemara; or not till after the compiling of the Mishna.

The Caraites themselves pretend to be the remains of the ten tribes led captive by Shalmaneser. Wolfius, from the memoirs of Mardacheus, a Caraites, refers their origin to a massacre among the Jewish doctors, under Alexander Jannæus, their king, about one hundred years before Christ: because Simeon, son of Schetach, and the queen's brother, making their escape into Egypt, there forged his pretended traditions; and, at his return to Jerusalem, published his visions, interpolating the law after his own fancy, and supporting his novelties on the notices which God, he said, had communicated by the mouth of Moses, whose depositary he was: he gained many followers; and was opposed by others, who maintained, that all which God had revealed to Moses was written. Hence the Jews became divided into two sects, the Caraites and Traditionaries: among the first, Juda, son of Tabbai, distinguished himself; among the latter, Hillel. Wolfius reckons not only the Sadducees, but also the Scribes, in the number of Caraites. But the address of the Pharisees prevailed against them all; and the number of Caraites decreased: and they long remained in obscurity. At length, about the year of our Lord 750, Anan, a Babylonish Jew of the race of David, and Saul his son, both men of learning, publicly disclaimed the authority of the traditionary doctrines of the Talmud, asserted the Scriptures to be the sole rule of faith, and became heads of the Caraites, or *Scripturarii*, who again grew into repute, and increased in numbers. To this late period some have ascribed the rise of the Caraites. See Mascler's Heb. Gram. vol. ii. p. 10. But from the history of the Rabbi Anan, who incurred great obloquy from the Pharisaical Rabbis for his heresy, it clearly appears, that he was not the author, but the restorer of the Caraites sect. Rabbi Schalomon, in the ninth century, maintained its credit; and among other persons well skilled in the Jewish law, who adhered to it, we may mention Abu-Alphareus, who lived in Palestine, and

wrote a commentary upon the Pentateuch, which added so much strength to the interest of the Caraites, that the traditional party thought it necessary to implore the assistance of the civil magistrate. Notwithstanding this, however, they continued to hold their assemblies, and subsisted, though in a declining state.

The Caraites are but little known; their works coming only into very few hands, even among the greatest Hebraists. Buxtorf never saw more than one; Selden two; but Mr. Trigland says, he has recovered enough to speak of them with assurance. He asserts, that from after the prophets had ceased, the Jews became divided on the subject of works, and supererogation: some maintaining their necessity from tradition; whilst others, keeping close to the written law, set them aside; and it was from these last that Caraitism commenced. He adds, that after the return from the Babylonish captivity, the observation of the law being to be re-established, there were several practices found proper for that end; and these, once introduced, were looked upon as essential, and appointed by Moses; which was the origin of Pharisaism; as a contrary party, continuing to keep close to the letter, founded Caraitism.

The modern Caraites, Leo of Modena observes, have their synagogues and ceremonies; they pretend to be the sole proper Jews, or observers of the laws of Moses: calling the rest by the term *Rabbanin*, or *followers of the Rabbins*: these hate the Caraites mortally; refusing to ally, or even to converse with them, and treating them as *monzerim*, or bastards; because of their rejecting the constitutions of the Rabbins relating to marriages, repudiations, purifications of women, &c. This aversion is so great, that if a Caraites would become a Rabbinit, he would never be received by the other Jews.

The Caraites, however, do not absolutely reject all kinds of traditions; but only such as do not appear well grounded. Selden, who is very express on this point, in his "*Uxor Hebraica*," observes, that besides the mere text, they have certain interpretations, which they call *hereditary*, and which are proper traditions. Their theology only seems to differ from that of the other Jews, in that it is purer and clearer of superstition: they give no credit to the explications of the Cabbalists, chimerical allegories, nor to any constitutions of the Talmud, but what are conformable to the Scripture, and may be drawn from it by just and necessary consequences.

Peringer observes of the Caraites in Lithuania, that they are very different, both in aspect, language, and manners, from the Rabbinites, wherewith that country abounds. Their mother tongue is the Turkish; and this they use in their schools and synagogues. In visage they resemble the Mahometan Tartars. Their synagogues are placed north and south; and the reason they give for it is, that Shalmaneser brought them northward: so that in praying, to look to Jerusalem, they must turn to the south. He adds, that they admit all the books of the Old Testament; contrary to the opinion of many of the learned, who hold that they reject all but the Pentateuch.

Caleb, a Caraites, reduces the difference between them and the Rabbinites to three points: 1. In that they deny the oral law to come from Moses, and reject the Cabbala. 2. In that they abhor the Talmud. 3. In that they observe the feasts, as the sabbaths, &c. much more rigorously than the rabbins do. To this may be added, that they extend the degrees of affinity, wherein marriage is prohibited, almost to infinity. Their distinguishing tenets may be summed up in the following particulars: that there is no other rule of faith and worship besides the writings of Moses and the

prophets: that all oral traditions, and all allegorical and mystical interpretations of the law are to be rejected: that all material beings were created by an uncreated Deity, of whom no resemblance can be found in any thing which he has made: that he knows all things, and exercises a constant providence over all his works: that the human mind is subject to divine influence, but at the same time remains free in its volitions: that true penitence takes away guilt: that after death, the soul, if it be worthy, ascends to the intellectual world, to live there for ever; but if it be guilty, it is consigned to a state of pain and ignominy: that God alone is to be worshipped; and that fasts are to be strictly observed. The present adherents of this sect are said to observe the moral precepts of their law more strictly than their brethren, the Pharisaic Rabbinites, with whom, nevertheless, they are thought unworthy of ecclesiastical communion. Upon the whole, the Caraites are universally reckoned men of the first learning, of the greatest piety, and of the purest morals of the whole nation.

See on this subject, Reland's *Antiq. Hebræor.* part ii. cap. 9. § 12. Trigland. de *Secta Karæorum.* Basnage's *Hist. of the Jews*, book ii. chap. 8, 9. Brucker's *Hist. Phil.* by Enfield, vol. ii. p. 174, &c.

CARALIA, in *Ancient Geography*, a town of Asia, in Pamphylia.

CARALIS, or CARALES, now *Cagliari*, a town of the island of Sardinia, the capital, according to Florus, pillaged by Gracchus. It was of Phœnician foundation, according to Pausanias, and had the right of Roman citizenship, according to Pliny. Ptolemy mentions a promontory and gulf of the name of "Carallis."

CARALLIA, or CARALLIS, an episcopal town of Asia in Isauria, according to Steph. Byz. or, according to the Notitia, in Pamphylia.

CARAMAN, in *Geography*, a town of France, in the department of the Upper Garonne, and chief place of a canton in the district of Ville-Franche; 5 leagues E.S.E. of Toulouse. The place contains 2,292, and the canton 9,161 inhabitants; the territory includes 152½ kilometres and 20 communes.

CARAMANGCE, in *Commerce*, a drug which comes from China. The Tonquinese value it very much.

CARAMANIA, in *Geography*, one of the divisions of Asia Minor, now a province of Turkey in Asia, situate on the southernmost part, and extending from north to south along the Mediterranean coast, which is its southern boundary. It formerly comprehended the ancient countries of Lycia, Pamphilia, Pisidia, Lycaonia, Isauria, Cilicia, part of Phrygia, Galatia, and Cappadocia. The Turks call the whole province Caraman-Ili. Its capital is Satalia. This province anciently belonged to the Caramanian princes, and was the last that submitted to the arms of the Ottomans, about the year 1488. Caramania may be divided into Greater and Lesser; the former comprehending all that part which lies to the north of mount Taurus, and the latter that part which lies southward along the coast. The coast of Caramania is for the most part mountainous, and above these high mountains it is not uncommon to see, in clear weather, a very small black cloud, no bigger than a bird. This globe of vapours is subject to great agitation; at first it is very small, then suddenly spreads, contracts, appears and disappears at intervals above the mountain, and changes its form every instant. How calm soever the atmosphere may be, a sudden and violent squall may be expected at the sight of these insulated clouds, which discharge the wind with so much rapidity and vehemence, that if a ship be not prepared to be overtaken by it, she runs a great risk of losing part of her sails,

sails, and even her masts and yards. During the calm which precedes the storm, a numerous shoal of fishes, cleaving the water level with its surface, and even darting above it, moves with great rapidity; and the agitation of these inhabitants of the depths of the sea is always a certain preface of an approaching and violent agitation in the atmosphere and the waters.

CARAMANICO, a town of Naples, in the province of Abruzzo Citra.

CARAMANTA, a province of Terra Firma in South America, lying on the river Cauca, bounded N. by the district of Carthage, E. by New Granada, and S. and W. by Popayan, in the audience of Sta. Fe. It is a valley surrounded by high mountains; and the natives extract from its waters very good salt. The capital, of the same name, lies in N. lat. $5^{\circ} 18'$. W. long. $72^{\circ} 35'$.

CARAMBIS, in *Ancient Geography*, a promontory of Asia Minor, in the most northern part of Galatia, according to Ptolemy, and, according to Sallust, between Heraclea and Paphlagonia; now "Capo Pisello."—Also, a town of Asia in Paphlagonia.

CARAMBOLA, in *Botany*, Rheed. Mal. 3. 51. Burm. Zeyl. 148. Ind. 106. See *AVERRHOA Carambola*.

CARAMBU, Rheed. Mal. 2. 55. See *JUSSIENA suffruticosa*.

CARAMNASSA, in *Geography*, a river of Hindoostan, which runs into the Ganges, near Buxar, in the country of Benares.

CARAMOUSSAL, in *Naval Architecture*, a Turkish vessel, having a very high stern, and rigged nearly like a ketch; that is, it has main and mizen masts and bowsprit, but neither foremast nor top-gallant masts.

CARAMUEL DE LOBKOWITZ, JOHN, in *Biography*, was born at Madrid in 1606; and having entered into the Cistercian order, he possessed various church preferments in the Low Countries and in Germany, and at length became grand vicar of cardinal Harrach, archbishop of Prague. But suddenly abandoning the church, he assumed the military profession, and in this capacity commanded a company against the Swedes, and acted as engineer and superintendent of the fortifications in Bohemia. He then resumed his former ecclesiastical character; and was successively bishop of Koniggratz in Bohemia, of Campagna in Naples, and of Vigevano in the Milanese, at which latter place he died in 1682. His works are numerous, and indicate a singular genius; and it was said of him, that he had invention in the eighth, or highest degree, eloquence in the fifth, and judgment in the second. His "Essay on Cabalistic Grammar," was published at Brussels in 1642; and his "Daring or Audacious Grammar," at Frankfurt in 1654. He wrote a large volume on the architecture of the temple of Solomon; and published at Vigevano a work, entitled "*Δεσποτικός*, i. e. Subtilissimus, vel Nova Dialectico-Metaphysica," distinguished more by subtilty than by clearness and sound sense. He was a strenuous defender of the doctrine of probability, and also of the infallibility of the pope. His theological writings that have been printed, amount to 7 vols. fol. Nouv. Dict. Hist.

CARAN, in *Geography*, a river of England, which runs into the Avon at Tewkesbury in Gloucestershire.

CARANA, in *Ancient Geography*, a town of Asia, in the Greater Armenia, which, according to Strabo, gave its name to the province "Caranitis." Steph. Byz. places Carana, which he says was built by the Romans, and also Caranitis, in Galatia.

CARANASI, in *Botany*, Rumph. Aub. 5. 49. See *CAPRARIA crustacea*.

CARANDA, a genus established by Gaertner for a kind of palm, described by Rumphius, the fructification of which is imperfectly known. *Spadix* and *spatha* not known. *Cal.* coriaceous, three-leaved. *Cor.* none. *Peric.* none. *Seed* superior, naked, pedicelled, affixed singly, or two or three together, to the base of the calyx. It is called, in the island of Ceylon, Ghalkarande, which means the stone kharande, to distinguish it from another kharande, or carandas, which Gaertner thinks is a species of *Randia*; but, in his opinion, even a blind man may see that the seed described by him belongs to the family of palms. Linnæus refers a Carandas of Rumphius to his *Carissa carandas*.

CARANGAS, in *Geography*, a province and jurisdiction of South America, belonging to the archbishopric of Plata, which begins 70 leagues W. from the city of Plata, and extends above 50 leagues. The climate of this province is so cold that it is barren in corn and grain, &c. but it abounds in cattle. Here are a great number of silver mines constantly worked, among which that called Turco is very remarkable for a sort of ore termed by miners Machacado; the fibres of the silver forming an admirable intertexture with the stone in which they are contained. Such mines are generally the richest. There are others found in the barren sandy deserts extending towards the west of the South Sea; in which are found, by digging in the sands, detached lumps of silver, not mixed with any ore or stone, beside that which adheres in some parts to the metal. The lumps are called "Papas," because they are dug out of the ground like that root; and they have the appearance of melted silver; which proves that they are formed by fusion. The size and figure of these lumps are very different, weighing from 2 to 60 and 150 marks; these last being a Paris foot in length. Juan and Ulloa's Voyage to S. America, by Adams, vol. ii. p. 153.

CARANJA, an island in the Indian sea, near the Concan coast; 3 leagues S. of Bombay. N. lat. $18^{\circ} 55'$. E. long. $72^{\circ} 44'$.

CARANNA, in *Commerce*, a hard, brittle, resinous gum, brought from some parts of the West Indies, as Carthage and New Spain; of an aromatic flavour; and sometimes used in medicine as a cephalic.

The trees from which it runs, are like the palm-tree. When it is fresh, it is white; but as it grows stale, it becomes greyish inclining to green, in which condition it is sent to Europe, where the white is seldom to be met with. It is brought in lumps wrapped up in leaves. To be of the best quality, it must be soft, of a pleasant aromatic smell, and as white as snow. As this gum is very dear, it is seldom sold unadulterated; and other sorts are often substituted in its stead, which have not the same properties. When applied to the head, it has an extraordinary virtue to relieve it from pain; which renders it highly valuable. It produces the same effects in the joints; and is so much esteemed in medicine, that it is become a proverb in pharmacy to say, Whatever the *tacamahaca* has not cured, the *caranna* will.

The Americans make a balm of it, which they pretend to be a sovereign remedy for the cure of wounds, and the hæmorrhoids or piles.

CARANUS, in *Ancient Geography*, was, according to Strabo, the port of Aradus, situate in Syria, 7 leagues S. W. of Paltus.

CARANUSCA, a town of Belgic Gaul, occupying, as d'Anville thinks, the spot now called "Garfch," between Metz and Treves.

CARAPA, in *Botany*, Lam. Encyc. Aub. Guian. (Perfoonia, Willd.) Class and order, *œrandria monogynia*.

Gen.

Gen. Ch. *Cal.* perianth four-cleft. *Cor.* petals four; nectary cylindrical, eight-toothed, bearing the anthers. *Stam.* eight. *Pist.* germ superior; style none; stigma large, salver-shaped. *Peric.* capsule one-celled, four-valved. *Seeds* numerous, angular, of various shapes, of a solid white substance, covered with a reddish, coriaceous skin, united together in an egg-shaped mass, which entirely fills the capsule. La Marck. Willd. with the assistance of La Marck's figure.

Sp. 1. *C. guianensis*, Aubl. Guian. Supp. p. 33. tab. 387. Lam. Ill. Pl. 301. (*Perfoonia guarcooides*, Willd.) "Leaflets in numerous pairs, oblong, acuminate." A tree sixty or eighty feet high, three or four feet in diameter. *Leaves* three feet long, alternate, abruptly winged; leaflets large, entire, smooth, sometimes in not less than nineteen pairs. *Flowers* in compound racemes. A native of Guiana, where a thick bitter oil is expressed from the seeds, with which the inhabitants anoint themselves as a security against the bite of insects. Excellent masts for ships are made of the trunk. 2. *C. moluccensis*, Lam. Enc. (*Granatum littoreum* five mactah, Rumph. Amb. 3. p. 92. tab. 61.) "Leaflets in about three pairs, acutely egg-shaped." A tree smaller than the preceding, sometimes producing two or three stems from the same root. *Leaves* four or five inches long; leaflets smooth. *Flowers*, according to Rumphius, dioicous, yellowish, small, scentless, in compound, axillary racemes. *Fruit* large, containing from twelve to twenty seeds, similar to those of the preceding species.

As two other genera have been named in honour of Perfoon, one from New Holland, by Dr. Smith, and another from North America, by Michaux, we have retained the original name given by Aublet, though it must be acknowledged to be exceptionable, on account of its resemblance to Carapa, another of Aublet's genera.

CARAPACE, the thick, solid, firm shell, which covers the turtle or tortoise; and to which adhere those fine transparent shells, which are known under the name of tortoise-shell, of which snuff-boxes and several sorts of inlaid work are made.

CARAPALLA, in *Geography*, a river of Italy, in the kingdom of Naples, and province of Capitanata, which runs into the Adriatic; 9 miles S. of Manfredonia.

CARAPANATUBA, a river of Guiana, which empties itself into the Amazon, at about one-third of a degree of the equator above fort Macapa. By the treaty between France and Portugal, 29th September 1801, it was concluded that the boundaries of French and Portuguese Guiana shall be determined in future by that river. These limits shall follow the course of the river to its source, whence they shall take a direction to the grand chain of mountains which divides the two rivers, and follow the windings of that chain to the point nearest to Rio Branco, between the second and third degree N. of the equator.

CARAPE, in *Ancient Geography*, a town of Asia, in the interior part of the Lesser Armenia, towards the mountains. Ptolemy.

CARAPICHEA, in *Botany*, Aubl. Guian. See *CALLICOCCA carapichea*.

CARAPITO, in *Geography*, a town of Portugal, in the province of Beira; 4 leagues N. of Pinhel.

CARAPO, in *Ichthyology*, a fish described by Marcgrave, of which he says there are two kinds, the first having a long and thin body, like a knife-blade, with the back thick, the belly very thin and narrow, and the tail pointed; the second narrower in proportion to its length, and without spots. The head of both is flat and pointed, and the lower jaw runs out a little farther than the upper. The latter character

seems to prove that these fishes are varieties of *Gymnotus fasciatus*, rather than of *Gymnotus carapo*, as some writers imagine. Gmelin considers the *Carapo* of Marcgrave as his *Gymnotus carapo*, which cannot be the fact if we may depend on Marcgrave, the Gmelinian fish of that name having the upper jaw longest instead of the lower one. See *GYMNOTUS carapo*, and *fasciatus*.

CARARA, in *Botany*. Pif. Bras. tab. 241. See *AMARANTHUS viridis*.

CARARA, in *Commerce*, a weight at Leghorn, and in other parts of Italy, used in the sale of wool and cod-fish, equivalent to sixty pounds of that country.

CARARA, anciently *Luna*, in *Geography*, a small town of Tuscany, celebrated for the white marble which was dug in its quarries, and which was not inferior to the marble of Paros either with respect to the fineness of its grain, or the beauty of its whiteness. The finest species of this marble is almost as hard as porphyry.

CARAROS, or CARARUS, in *Ancient Geography*, a town of Africa Propria, in the vicinity of Targarum.

CARASCHULLI, in *Botany*. Rheed. Mal 2. tab. 47. See *BURLERIA buxifolia*.

CARASCOF, in *Geography*, a town of Poland, in the palatinate of Kiof, 34 miles W. of Bialacerkiew.

CARASOU, a town of Lesser Tartary in the Crimea, once very populous, but burnt by the Russians in 1737.—Also, the name of two rivers in Turkey, one of Nativia, in Caramania, the other in Romania.—Also, the name of a lake, being part of the canal which forms the most southerly mouth of the Danube, called by the Turks "Carakirmen."

CARASSIUS, in *Ichthyology*, a species of *CYPRINUS*, which inhabits the fresh waters of Europe; *Carassius* of Marf. Danub. supposed by some to be the same with the Rud of English writers. See *CYPRINUS carassius*. Obs. Among the old writers carassius was considered as a kind of generic name for the carp, bream, &c.

CARASYRA, in *Ancient Geography*, one of the forts of Thrace, erected by the emperor Justinian in the province of Rhodope.

CARAT. See *CARACT*.

CARATÆ, in *Ancient Geography*, the name of a people who formed part of the ancient Jacæ, and who inhabited the coast of the Caspian Sea, on the banks of the Jaxartes.

CARA-TARTARS, in *Geography*, or *black Tartars*, a people of Asia; formed by a body of Turks, incorporated by Kuli-khan the grandson of Gengis-khan in his army, when he was sent to Iran by Mangou-chan, his brother, emperor of the Moguls. They now occupy the countries of Geta and Touran in Asia.

CARATCHOLIS, a people of Asia in Georgia, N. of mount Caucasus. They are also called "Karakinks" and black Circassians.

CARATING, in *Chemistry*, a term used to denote the mixture or combination of gold with other metals. Thus, "red carating" expresses the mixture of gold with copper, to distinguish it from the less usual one, made with silver, and denominated "white carating," and also in contradistinction to the "mixed carating" or combination of gold, silver, and copper. The degree of this combination or alloy is expressed by carats and grains. See *CARACT*.

CARATTERE, *Ital.* character. A musical term, in speaking of a song of two strains; *aria di due caratteri*; of which the first is generally *cantabile*, and the second *bravura*. See *CANTABILE* and *BRAVURA*.

CARAVACA, or *St. Cruz de Caravaca*, in *Geography*, a town

a town of Spain, in the province of Murcia; 40 miles W S.W. of Murcia.

CARAVAGA, a river of Peru in South America, famous for its golden sands.

CARAVAGGIO, in *Biography*. See ANGELO AMERIGI.

CARAVAN, or CARAVANNE, in the east, a troop or company of travellers, merchants, and pilgrims, who for their greater security march in a body through the deserts, and other dangerous places, infested with Arabs and robbers.

The word comes from the Arabic *cairawan*, or *cairoan*; and that from the Persian *kervan*, or *cârvân*, *negociator*, a trader, or dealer. Vid. Peritil. Itin. Mund. ed. Hyde. p. 61.

There is a chief, or aga, called "caravan-bachi," who commands each caravan, and has under him a number of janizaries, or other forces, sufficient for their defence. The caravans encamp every night near wells, or rivulets known to the guides; and observe a discipline as regular as in war. They chiefly use camels for their vehicles, because of their enduring much fatigue, eating little, and passing three or four days without drinking.

In this manner trade was carried on, particularly by the nations near the Arabian gulf, from the earliest period to which historical information reaches. See CAMEL.

The grand signior gives one fourth part of the revenue to Egypt, to defray the expence of the caravan that goes yearly from Cairo to Mecca, to visit Mahomet's tomb: the devotees, in this caravan, are from 40,000 to 70,000; accompanied with foldiers to protect them from the pillage of the Arabs, and followed with 8 or 9,000 camels, laden with all necessary provisions for so long a passage across deserts.

There are two regular caravans which go yearly to Mecca; the first from Damascus, composed of the pilgrims from Europe and Asia; the second from Cairo, for the Mahometans of Barbary.

Damascus is the grand rendezvous for all the pilgrims from the north of Asia, as Cairo is for those from Africa. Besides the natives of Aleppo who go to Mecca, numbers from Persia and the northern provinces assemble in that city in their way to Damascus, for which place the caravan sets out immediately after the lesser Bairam. When the caravan sets out from Aleppo, it is conveyed for a few miles by the governor and grandes in procession, and many of the pilgrims being accompanied still farther in their way by their women and kinsmen, all is in commotion on the road to Damascus for several days after the Bairam. However, the number of pilgrims who go from Aleppo to Mecca is said to be much less considerable now than formerly. This probably is owing in part to the decaying spirit of Mohammedism, but more to the decline of the trade with Mecca; for it was usual with the merchants, formerly, to make the journey several times in their life, and the caravans were accustomed to return, laden with Indian and Arabian merchandize. After the junction of the caravans from other towns at Aleppo, it proceeds to Damascus; and the number of pilgrims every year is said to amount to from 30 to 50,000; many of them repair hither four months before the time, but the greatest number only at the end of the Ramadan. Damascus then resembles an immense fair; nothing is to be seen but strangers from all parts of Turkey, and even Persia; and every place is full of camels, horses, mules, and merchandize. At length, after a preparation of some days, this vast multitude set out confusedly on their march, under the conduct of the bashaw or pacha of Damascus,

and, travelling by the confines of the desert, arrive in 40 days for the festival of Bairam at Mecca; the distance between the two cities being, according to the most moderate estimate, above a thousand miles. As this caravan traverses the country of several independent Arabs, it is necessary to make treaties with the Bedouins, to allow them certain sums of money, for a free passage, and to take them for guides. On this subject frequent disputes occur between the Scheiks, of which the pacha avails himself to make a better bargain; but in general the preference is given to the tribe of Sardia, which encamps to the south of Damascus, along the Hauran: the pacha sends to the Scheik a mace, a tent, and a pelisse, to signify that he takes him as his chief conductor. From this moment it is the Scheik's business to furnish camels at a stated price; these he hires likewise from his tribe and his allies: the pacha is responsible for no damages, and all losses are on his own account. On an average, 10,000 camels perish yearly; which form a very advantageous article of commerce for the Arabs. It must not be imagined that the sole motive of all the expences, risks, and fatigues, incurred by the pilgrims, is devotion. Pecuniary interest has a considerable share in these expeditions, and, indeed, permission to trade, during the pilgrimage, is granted by the Koran, chap. ii. p. 23. The caravan affords the means of engrossing every lucrative branch of commerce; and almost all the pilgrims convert it into a matter of speculation. On leaving their own country, they load themselves with merchandize, which they sell on the road; the specie arising from this, added to what they have brought with them, is conveyed to Mecca, where they exchange it for muslins and Indian goods from Malabar and Bengal, the shawls of Cashmere, the aloes of Tonquin, the diamonds of Golconda, the pearls of Bahrein, pepper, and a great quantity of coffee from Yemen. Sometimes the Arabs of the deserts deceive the expectation of the merchant, by pillaging the stragglers, and carrying off detached parties of the caravan. Of the predatory spirit of the Arabs it is a singular proof, that although all their independent tribes are zealous Mahometans, yet they make no scruple of plundering the caravans of pilgrims, while engaged in performing one of the most indispensable duties of their religion. A remarkable instance of this occurred in the year 1757; when 60,000 pilgrims were plundered and dispersed over the desert, a great number destroyed by sword or famine, women reduced to slavery, immense riches lost, and above all, a solemn act of religion sacrilegiously violated. This produced a commotion in the empire, which was not soon forgotten. The plundering Arabs were the allies of Daher, who received them at Acre, and there permitted them to sell their booty. The Porte, indeed, loaded him with the bitterest reproaches, but he endeavoured to exculpate himself, and to appease the Divan, by sending the white banner of the prophet to Constantinople. In general, however, the pilgrims arrive safe; and in this case their profits are very considerable. At all events they are recompensed in the veneration attached to the title of "Hadji," or "Hadgy," (pilgrim); and by the pleasure of boasting to their countrymen of the wonders of the Caaba (See CAABA) and mount Arafat; of magnifying the prodigious crowds of pilgrims, and the number of victims, on the day of the Bairam; and by recounting the dangers and fatigues they have undergone, the extraordinary figure of the Bedouins, the desert without water, and the tomb of the prophet at Medina.

By means of this caravan, Damascus is become the centre of a very extensive commerce. By Aleppo the merchants of

of this city correspond with Armenia, Anatolia, the Diarbekir, and even with Persia. They send caravans to Cairo, which, following a route, frequented in the time of the patriarchs, take their course by Djefr-Yakoub, Tabaria, Nablous, and Gaza. In return they receive the merchandize of Constantinople and Europe, by way of Saide and Bairout. The home consumption is balanced by silk and cotton stuffs, which are manufactured here in great quantities, and are very well made; by the dried fruits of their own growth, and sweetmeat cakes of roses, apricots and peaches, of which Turkey consumes to the amount of about 40,000. The remainder, paid for by the course of exchange, occasions a considerable circulation of money in custom-house duties, and the commission of the merchants. This kind of commerce has existed in these countries from the earliest antiquity. It has flowed through different channels, according to the changes of the government, and other circumstances; but it has every where left very apparent traces of the opulence produced by it. See Volney's Travels in Egypt and Syria, vol. ii. Russell's Aleppo, vol. ii.

The caravan from Cairo in Egypt is composed, not only of pilgrims from every part of Egypt, but of those that arrive from all the small Mahometan states on the African coast of the Mediterranean, from the empire of Morocco, and even from the negro kingdoms on the Atlantic. During the months of April, May, and June, in every year, these rich caravans from the interior of Africa arrive at Cairo; carrying thither a considerable quantity of three species of gums, elephants' teeth, tamarinds, parrots, ostrich feathers, gold dust, and black slaves; and in return they convey into their own country false pearls, coral, amber, glass-ware, broad swords, cloths, and all kinds of clothing, which are purposely made by the manufacturers of Cairo to suit the African taste. When assembled, the caravan consists at least of 50,000 persons, and the number of camels employed in carrying water, provisions, and merchandize is still greater. In the month of Ramadan, viz. one month previous to the departure of this caravan from Cairo, begins the fair, vulgarly called "Maülád (or, the birth of the prophet). Strangers of every nation and religion repair hither to dispose of their merchandize. At this fair European merchandize is the most required; and of coin the sequin of Venice is preferred. The pilgrims purchase them at the highest price, as it is the coin from which they derive the greatest profit. The women are not less anxious to obtain them than the men, for the purpose of ornamenting the head and bosom. The journey, which, in going from Cairo, and returning hither, is not completed in less than 100 days, is performed wholly by land; and as the route lies mostly through sandy deserts, and barren uninhabited wilds, which seldom afford any subsistence, and where often no sources of water can be found, the pilgrims always undergo much fatigue, and sometimes must endure incredible hardships. Of this caravan an early and good description is published by Hakluyt, vol. ii. p. 202, &c. Maillet (*Descript. de l'Egypte*, part ii. p. 212, &c.) has entered into a curious and minute detail with regard to it: and Pocock (vol. i. pp. 188, 261, &c.) has given a route, together with the length of each day's march, which he received from a person who had been 14 times at Mecca. Upon the return of the caravan to Cairo, another fair begins, more sumptuous and rich than that already mentioned; where strangers barter for new commodities, and part with those which they had not been able to sell at the departure of the caravan. Thus the commerce of Cairo extends by land as far as Mecca in consequence of this yearly pilgrimage, and also into the interior of Africa by the caravans of pilgrims.

Great as these caravans are, we must not suppose that all the pilgrims who visit Mecca belong to them. Such con-

derable additions are received from the extensive dominions of Persia, from every province of Hindoostan, and the countries to the east of it, from Abyssinia, from various states on the southern coast of Africa, and from all parts of Arabia, that when all are assembled, they have been computed to amount to two hundred thousand. In some years the number is further increased by small bands of pilgrims from several interior provinces of Africa, the names and situation of which are just beginning to be known in Europe. For this last fact we are indebted to the Association for promoting the discovery of the interior parts of Africa. In the report of the committee of the privy council on the slave trade, and also in Brown's Travels in Africa, (chap. 18.) other particulars are contained: and it appears that the commerce carried on by caravans in the interior parts of Africa, is not only widely extended, but of considerable value. Besides the great caravan which proceeds to Cairo, and is joined by Mahomedan pilgrims from every part of Africa, there are caravans which have no object but commerce; which set out from Fez, Algiers, Tunis, Tripoli, and other states on the sea-coast, and penetrate far into the interior country. Some of them take no less than 50 days to reach their place of destination; and as the medium of their rate of travelling may be estimated at about 18 miles a day, the extent of their journey may be easily computed. As both the time of their outset, and their route are known, they are met by the people of all the countries through which they travel, who trade with them. Indian goods of every kind form a considerable article in their traffic, in exchange for which the chief commodity they can give is slaves. Three distinct caravans are employed in bringing slaves, and other commodities, from the interior of Africa to Cairo. One of them comes straight from Mourzouk, the capital of Fezzan; another from Sennaar, and the third from Fúr. They do not arrive at fixed periods, but after a greater or less interval, according to the success they may have had in procuring slaves, and such other articles as are suited to the market, the orders of their respective rulers, and various other accidental circumstances. The Fezzan caravan is under the best regulations. The merchants from that country employ about 50 days in their passage from Mourzouk to Cairo; which city they as often as possible contrive to reach a little before the commencement of Ramadan, that such as find themselves inclined to perform the pilgrimage may be prepared to accompany the emir of Misr. The sale of their goods seldom employs them in the city much more than two months; after the expiration of which, those who have no design of visiting Mecca, return to their native country. The arrival of this caravan is generally annual. Those who compose this caravan from Mourzouk to Cairo are collected from the empires of Bornou and Cassina, from the extensive kingdom of Caffaba, and from several of the Negro states. It seldom consists of less than 100, or of more than 300 travellers; and begins its journey on the last week of October, or in the first of the succeeding month. At the close of the seventh day it arrives at Temissa, and in two days more, at a lofty, rocky, uninhabited, and barren mountain, called Xanibba. Here they recruit their goat-skin bags with water from the only well which these heights afford, and then descend to a vast and dreary desert, whose hilly surface, for four successive days, presents nothing to the eye but one continued extent of black and naked rock, to which, for three days more, the equally barren view of a soft and sandy stone succeeds. On the eighth day they reach the vast mountain of Ziltan, the passage of which occupies four days of labour; and in the four succeeding days they cross the sultry plain that extends with its barren sands from the foot of the mountain to the verdant heights

of Sibbeel, and at the close of the following day they arrive at the town of Augéla. From Augéla, which is subject to Tripoli, and famous for the abundance and excellent flavour of its dates, they proceed in one day to the village of Gui Xarrah, and another brings them to the long ascent of the mountain of Gerdóbah. Descending from this height, where they procure, during five days of their passage over it, but a scanty supply of unpalatable water, they enter the narrow plain of Gegabib, which is sandy and uninhabited, but fertile in dates, annually gathered by the people of Duma, a town dependent on Tripoli, and situate on the coast at the distance of eight days' journey from Gegabib. After a march of three days they are conducted to a desolate mountain called Bufelega, that furnishes only water; and in three days more they enter the dominions of the independent republic of See-wah. From See-wah, the capital, the caravan proceeds in a single day to the miserable village of Umfugér, situate at the foot of the mountainous desert of le Mágra, whence, after seven days, it arrives at the hill of Huaddy l'Otrón, distinguished by a small convent of three Christian monks, under the protection of Cairo. By these monks the travellers are hospitably entertained; and thence they continue their course, and on the fifth day reach the city of Cairo, from whence, at the proper season, they pursue their route to Mecca.

The other two caravans from Sennaar and Fûr, are extremely various in their motions; sometimes not appearing in Egypt for the space of two or even three years, and sometimes two or more distinct caravans arriving in the same year. The perpetual changes in their several governments, and the caprices of their despots, are in a great degree the occasion of this irregularity. The road also between these two places and Cairo is often infested by bodies of independent Arabs, as that of Sennaar by the Ababbé and Shaikié, and that of Fûr by the Cubba-Beesh and Bedaiât. The departure of a caravan from Dar-Fûr forms an important event: it engages the attention of the whole country for a time, and even serves as a kind of chronological epocha. The period of their arrival at Cairo is as uncertain as that of their departure; for they travel indifferently either in winter or summer. The journey from Assûan to Sennaar requires much less time than that from Assûat to Dar-Fûr. The roads of the desert are not distinguishable by any permanent marks; and as they are perfectly ignorant of the compass, and so imperfectly acquainted with the fixed stars, they are often at a loss for the road, and sometimes deviate into dangerous paths. In passing from Dar-Fûr to Egypt, they consider 2000 camels and 1000 slaves a large caravan. Camels are indispensable for these long and fatiguing journeys, and therefore they are reared by the Arabs and Jelabs with great care: nevertheless, the merchant pays nearly as much for the camels to carry his merchandize as he did for the commodities themselves. Horses are little used by the Jelabs: they generally furnish themselves with Egyptian asses, which are afterwards sold at Souðan at an advanced price. The customary food of the drivers and servants of the caravan consists of the milk of the camel, with a few dates, together with the meal of barley, or of Indian corn, which is sometimes seasoned with oil, to which the merchant superadds, for his own use, the dried flesh of the camel, or of sheep, and concludes his repast with coffee. Water is drawn from the wells, when they occur, in leather buckets, that form a part of the travelling equipage of the caravan, and is carried in the skins of goats, through which, however, though tarred both within and without, it is often exhaled by the heat of the noon-day sun. A very easy mode of conveyance is provided for the women and children, and for

persons either ill or infirm. Six or eight camels are yoked together in a row, and several tent poles are placed in parallel lines upon their backs: these are covered with carpets, and bags of corn are superadded to bring the floor to a level, as well as to soften the harshness of the camel's movement: other carpets are then spread, and the traveller sits or lies down with as much convenience as if he rested on a couch. The provisions of the Dar-Fûr caravan are scanty and indifferent, nor are any of them furnished with dried meat as is common with the Fezzaners. Few use coffee and tobacco, and the rest content themselves with a leathern bag of flour, another of bread baked hard, a leathern vessel of honey or treacle, and another of butter. In travelling from Dar-Fûr to Egypt, another article is much used, especially for the slaves, which is the grain called millet. Of this they take a quantity after it has been coarsely ground, and causing it to undergo a slight fermentation, they make of it a paste. When they use it they add water, and it becomes a tolerably palatable food, allaying thirst whilst it assuages hunger. Experienced travellers, among every ten camels laden with merchandize, charge one with beans, and straw chopped small, which, sparingly given, serve them during the greater part of the journey. Water, instead of being conveyed in goat skins, the evaporation of which no skill can entirely prevent, is carried in ox hides, which the Jelabs, on their march from Souðan to Egypt, form into capacious sacks, and properly season with tar or oil. A pair of these is a camel's load. The "Cabba-Beesh" and the "Bedaiât," when they make any attempt on the caravans, commonly shew themselves between Leghea and Bir-el-Malka. But this road is so ill provided with any kind of accommodation for man or beast, that neither the wandering tribes, nor the ferocious animals which infest other parts of the continent, are commonly found there. The Egyptians and other whites, therefore, though they commonly carry fire-arms with them from the North, generally take advantage of the market of Fûr, and return without any. The natives of Souðan are furnished with a light spear, the head of which is made of unhardened iron of their country. They have also a shield about three feet long, and $1\frac{1}{2}$, or $\frac{3}{4}$ foot broad, composed of the hide of the elephant, or hippopotamus, very simple in its construction. No regular caravan of Hadgis leaves Dar-Fûr, but a number of the natives make their way to Mecca, either with the caravan of merchants trading to Egypt, or by way of Suakem or Jidda.

Upon the whole we may observe, that independently of those caravans that are formed from religious motives, most of the inland commerce of the East has been for many ages carried on by means of caravans. In former times, caravans traversed the whole latitude of Asia in 243 days, from the Chinese Ocean to the sea-coast of Syria. Silk was immediately delivered to the Romans by the Persian merchants, who frequented the fairs of Armenia and Nisibis; but this trade, which, in the intervals of truce, was oppressed by avarice and jealousy, was totally interrupted by the long wars of the rival monarchies. However, the cities of Samarcand and Bokhara were advantageously situated for the exchange of the various productions of Asia; and their merchants purchased from the Chinese the raw or manufactured silk, which they transported into Persia for the use of the Roman empire. In the vain capital of China, the Sogdian caravans were entertained as the suppliant embassies of tributary kingdoms; and if they returned in safety, the bold adventurer was rewarded with exorbitant gain. But the difficult and perilous march from Samarcand to the first town of Shensi, could not be performed in less than 60, 80, or 100 days. As soon as they had passed the Jaxartes they entered

tered the desert; and the wandering hordes, unless they are restrained by armies and garrisons, have always considered the citizen and the traveller as the objects of lawful rapine. In order to escape the Tartar robbers, and the tyrants of Persia, the silk caravans explored a more southern road; they traversed the mountains of Thibet, descended the streams of the Ganges or the Indus, or expected with patience, in the ports of Guzerat and Malabar, the annual fleets of the West. But the dangers of the desert were found less intolerable than toil, hunger, and the loss of time; and therefore the attempt was seldom renewed; and the only European who has passed that unfrequented way, applauds his own diligence, that in nine months after his departure from Pekin, he reached the mouth of the Indus.

The same intercourse which was anciently kept up by the provinces in the north-east of Asia with Hindoostan and China, still subsists. Among all the numerous tribes of Tartars, the demand for the productions of these two countries is very considerable. In order to supply them, caravans set out annually from Bokhara, Samarcand, Thibet, and several other places, and return with large cargoes of Indian and Chinese goods. But the trade carried on between Russia and China, in this part of Asia, is by far the most extensive and best known. Some connexion of this kind has probably been kept up between them from the earliest period; but it greatly increased after the interior parts of Russia were rendered more accessible by the conquests of Zenghis Khan, and Tamerlane. The commercial nations of Europe were so well acquainted with the mode of carrying on this trade, that soon after the Portuguese had opened the communication with the East, by the Cape of Good Hope, an attempt was made, in order to diminish the advantages which they derived from this discovery, to prevail on the Russians to convey Indian and Chinese commodities through the whole extent of their empire, partly by land carriage and partly by means of navigable rivers, to some port on the Baltic, from which they might be distributed through every part of Europe. This scheme was rendered practicable by the conquests of Ivan Basilowitz, and the genius of Peter the Great. Though the capitals of the two empires were situated at the immense distance of 6378 miles from each other, and the route lay for above 400 miles through an uninhabited desert, caravans travelled from the one to the other. But though it had been stipulated, when this intercourse was established, that the number of persons in each caravan should not exceed 200, and though they were sent up within the walls of a caravansera during the short time they were suffered to remain in Pekin, and were allowed to deal only with a few merchants, to whom a monopoly of the trade with them had been granted; yet, notwithstanding all these restraints and precautions, the jealous vigilance with which the Chinese government excludes foreigners from a free intercourse with its subjects was alarmed, and the admission of the Russian caravans into the empire was soon prohibited. After various negotiations, it was agreed, that two towns should be built almost contiguous, on the boundaries of the two empires, Kiachta inhabited by Russians, and Maimatshin by the Chinese. To these all the marketable productions of their respective countries are brought by the subjects of each empire; and the furs, the linen and woollen cloth, the leather, glass, &c. of Russia, are exchanged for the silk, the cotton, the tea, the rice, the toys, &c. of China. See RUSSIA and CHINA.

M. Bougnon, geographer of the duke of Lorraine, has given a treatise of the caravans of merchants in Asia, wherein he shews of what they are composed; how many sorts there are; the several uses of the different sorts of animals in them; the price given for them; the officers and

men appointed to conduct them, and the pay of each; with their manner of marching, halting, fighting, treating, &c.

In the heavy caravans, to five hundred elephants there are a thousand dromedaries, and at least two thousand horses, escorted by four thousand cavaliers. Two men are required to lead each elephant; five to three dromedaries; and seven to twelve camels. Such a number of servants joined with the officers and passengers, the number whereof is not limited, renders the body very formidable; the passengers, indeed, are not obliged to fight, but in case they refuse, provision will scarcely be allowed them afterwards, even for their money.

As few of the Arab princes have any other substance than what they can get by pillage, they keep continually spies on foot to give them intelligence of the departure and motions of caravans, which they frequently attack with superior forces: in case of repulse, they come to an accommodation; but if the caravan be beaten, it is absolutely plundered, and the whole guard made slaves; though more indulgence is shewn to strangers. The taking of a single caravan sometimes enriches a prince for ever.

The profits to be made in a caravan, during its march, are often incredible; Mr. Bougnon gives instances where, by repeated bargains and exchanges, a person has made twenty thousand crowns out of a single gold watch, and thirty louis d'ors.

Any dealer is at liberty to form a company, in order to make a caravan. He in whose name it is raised, is considered as the caravan bachi, or chief of the caravan, unless he appoint some other in his place. If there be several merchants equally concerned, they elect a caravan-bachi; after which they appoint officers to conduct the caravan, and decide all controversies which may arise during the journey.

In the East, days' journies are distinguished into journies of horse-caravans, and caravans of camels: those of horses are equal to two of camels. Mr. Rennell, in an ingenious dissertation on the rate of travelling, as performed by camels, (Phil. Trans. vol. lxxxi. p. 129—145) of which some account has been given under the article CAMEL, has shewn how to apply the hourly rate of the camel's travelling in caravans as an useful scale to the geography of Africa; and it will also serve for the estimate of distances and of time, in other countries, where camels and caravans are in use. He distinguishes caravans into *heavy* and *light*. Camels loaded with from 500 to 600 pounds, which are a camel's load, form what is called the *heavy* caravan; and *light* caravans, on the contrary, are applied to camels under a moderate load, or perhaps little more than half-loaded. Having settled the mean daily rate of the heavy caravan at 18.64 British miles, reckoning $2\frac{1}{2}$ miles for each hour, and 19.06, if taken at 2.56, and the mean rate of the light caravan, 22.17 miles, at $2\frac{1}{2}$, and 22.7 at 2.56; he observes, that, in order to apply the scale with effect to the African geography, it is necessary to state the number of days that the caravans usually halt on the road. From various inquiries he concludes that, at an average, one halt must be allowed to $12\frac{1}{2}$ travelling days; and this, of course, must be deducted from the aggregate of the distance: or should it be averaged on each day, the heavy caravan day must be reckoned at 17.14 miles instead of 18.64; and that of the light caravan 20.4, instead of 22.17, when the hourly rate is taken at $2\frac{1}{2}$ miles. It further remains to be stated from the proportion that the road distance bore to the direct distance, what length in direct distance, and in geographical miles, may be allowed for each day, for the heavy caravan, on lengths of journey, and over tracts of country

similar to the route of Mr. Carmichael from which the estimate is made. It appears that on the 28 days between Aleppo and Rackama (opposite Mesjid Ali) the mean length of the day's journey in direct distance is about $15\frac{1}{4}$ geographical miles; and on the whole 45 days between Aleppo and Bussorah, 13.8 such miles. If allowance be made for halts, these will require a deduction of 8 parts in 100 to be made from the gross amount of the whole journey, when applied to the purposes of geography. Mr. Carmichael counted the camel's steps in order to ascertain a scale of distance. Mr. Holford also did the same, and measured the length of them on the ground. The former gentleman counted the double steps, or rather the return of the same foot of a camel on which he rode, for an hour together on 20 different days, at such times as admitted of the greatest variation in the rate of motion. He found the greatest number of steps to be 2420, the least 2086; and the mean of the whole 20 hours was 2200. The latter gentleman reckoned the greatest 2240, least 2060; mean 2150. They both report the double step to be $5\frac{1}{2}$ feet. The result of the former account is 2.29 British miles per hour; of the latter 2.24: each allowed his distance accordingly in his journal. But Mr. Rennell observes, that their computed distances fall very short of the truth. The error probably originated from their measuring too small a number of steps on the ground as the foundation of their calculation. The reason of the great variation in the number of paces, in a given time, is the plenty or scarcity of the desert shrubs, on which the camels feed as they go on; and then such experiments become useless unless the quality of the desert were described in every part of it.

Some have reckoned five sorts of caravans, viz.

CARAVAN, *heavy*, composed of elephants, dromedaries, camels, and horses.

CARAVAN, *light*, in which there are but few elephants.

CARAVAN, *ordinary*, that in which there are no elephants.

CARAVAN *of horses*, that in which there are neither camels nor dromedaries, but only horses.

CARAVANS, *sea*, companies of merchant vessels, laden with goods, and convoyed by ships of war. Such are those which pass from Constantinople to Alexandria.

CARAVAN is also an appellation given to the voyages, or campaigns, which the knights of Malta are obliged to make at sea against the Turks and corsairs, in order to arrive at the commanderies and dignities of the order. They are thus called, because the knights have frequently seized the caravan going from Alexandria to Constantinople.

CARAVANIER, a person who leads the camels and other beasts of burden used in the caravans of the East.

CARAVANSERA, a large public building, or inn, destined to receive and lodge the caravans.

The word comes from the Arabic *carawan*, or Persian *karwan* or *cârvân*, a caravan, and *ferai*, a large house.

Of these caravanferas, or as Chardin calls them, *caravanferai*, there are a great number throughout the east; erected out of the charity and magnificence of the princes, &c. of the several countries, for the accommodation of travellers. They are called by the Turks "Kanes;" and are situated sometimes in the towns and villages; sometimes at convenient distances upon the road.

Those of Schiras and Casbin in Persia, are said to have cost sixty thousand crowns each. They are open to people of all religions and countries, without any questions asked or any money required.

The caravanferai are usually huge square buildings, with a spacious court in the middle of them. They are encom-

passed with galleries and arches, under which runs a kind of banquette, or elevation, some feet high, where travellers rest themselves, and make their lodgings as well as they can; their baggage and the beasts that carry them being fastened to the foot of the banquette. Over the gate, there is frequently a sort of little chambers, which the caravanferaskier lets out at a very dear rate to such as wish to be retired.

Though the caravanferas serve in lieu of inns, yet there is this essential difference between them and our inns, that the traveller finds nothing at all in the caravanfera either for himself, or his cattle; but must carry all his provisions and necessaries with him. They are chiefly built in dry barren desert places; and are generally furnished with water from a great distance, and at a vast expence; there being no caravanfera without its well of water. There are several of them in cities; where they serve not only as inns, but as shops, warehouses, and even exchanges.

There are some caravanferas where most things may be had for money; and as the profits of these are considerable, the magistrates of the cities to whose jurisdiction they belong, take care to store them well; they have an inspector who fixes the price of lodging, without appeal. Such well-furnished resting places appear to have been known in Judæa in the time of our Lord; since he supposes the good Samaritan committed the poor wounded man to the care of the host, or keeper of the caravanfera, and promised at his return to pay him for whatever things the distressed traveller required, and which the keeper furnished him with. Luke x. 34, 35.

There are few cities in the east without their caravanferai; especially within the dominions of the great Mogul. Those of Constantinople, Ispahan, and Agra, the capitals of these three empires, are distinguished for their magnificence and commodiousness. The caravanferas of Schiras and Casbin, considerable cities of Persia, are also in high reputation, and little inferior to those of the capital.

In Turkey, none but the grand signior's mother and sister, with the visiers and bashaws who have been in three battles against Christians, are allowed to build a caravanfera.

CARAVANSERASKIER, the director, steward, or intendant of a caravanfera.

At Ispahan there are caravanferas in manner of halls or exchanges, where goods are laid up, and exposed to view; for which the caravanferaskier is accountable, in consideration of a certain fee.

CARAVEL, the name of a vessel formerly used by the Spaniards and Portuguese; the masts were inclined, in place of being upright as usual, with triangular sails. Vessels of this description sailed fast, and would lie near the wind.

CARAVEL is also the name of a small vessel employed on the coast of France in the herring fishery; and these are commonly from twenty-five to thirty tons burthen. French vessels in the same employment in the British channel are called Trinquarts; these are in general from twelve to fifteen tons burden.

CARAVELLA, in *Zoology*, a species of Medusa described in Sloane's History of Jamaica. See MEDUSA *Caravella*.

CARAVI, in *Geography*, a small island in the Grecian Archipelago. N. lat. $36^{\circ} 53'$. E. long. $23^{\circ} 36'$.

CARAVILLA, a town of Naples, in the country of Molise; 12 miles N.W. of Molise.

CARAUNA, in *Ichthyology*, the name of a small Brazilian fish described by old writers as being of a fine bright red colour, with innumerable black spots all over it. The exact species

species is uncertain, but it appears to be a fish of the Labrus genus.

CARAUSIUS, in *Biography*, a native of Menapia or Maritime Flanders, who usurped the empire in Britain in the third century. According to Dr. Stukely (*Hist. of Carausius*) he was a native of St. David's, and a prince of the blood royal of Britain. Although sprung from the meanest origin "vilissimè natus," according to the expression of Eutropius, he advanced himself by his naval skill, as a pilot, and by his experience and valour in maritime expeditions, to stations of trust and service, under Probus and his successors. Having by the display of his talents ingratiated himself with Maximian, this emperor employed him in conducting an enterprise against the Franks and Saxons, who by their piracies had rendered the navigation of the seas impracticable. With this view he was appointed to the command of a squadron, assembled at Gesloriacum or Boulogne. Carausius availed himself of the opportunity which this office of trust afforded him for acquiring, by various captures of vessels richly laden with spoil, ample treasures; which he appropriated to his own use. Maximian, enraged by his treacherous and fraudulent conduct, determined to put him to death without trial. The crafty Carausius foresaw and prevented the severity of the emperor. By his liberality he had attached to his interest the fleet which he commanded; and from the port of Boulogne he sailed over to Britain; where, persuading the legion, and the auxiliaries that guarded the island, to join his party, he boldly assumed the imperial purple, and the title of Augustus, and set at defiance the justice and the arms of his injured sovereign. This event happened, during the joint empire of Dioclesian and Maximian, A. D. 286. In order to secure his usurpation he augmented his fleet, attached to his cause by a variety of artful methods the Franks and Saxons, and whilst he defended the frontiers of his dominions against the Caledonians of the North, invited from the continent a great number of skilful artists, and displayed, in various coins which are still extant, his taste and opulence. He still preserved the possession of Boulogne and the adjacent country. His fleets rode triumphant in the channel, commanded the mouths of the Seine and of the Rhine, ravaged the coasts of the ocean, and diffused beyond the columns of Hercules the terror of his name. Under his command, Britain destined in a future age to obtain the empire of the sea, already assumed its natural and respectable station of a maritime power. As he had seized the fleet of Boulogne, he had deprived his master of the means of pursuit and revenge. After a disappointed effort by a new armament, consisting of imperial troops unaccustomed to the sea, Dioclesian and his colleague resigned to Carausius the sovereignty of Britain, and reluctantly admitted their perfidious servant to a participation of the imperial honours. His civil government, whilst it lasted, was oppressive and tyrannical. He held the people in a state of perfect subjugation, and at the same time indulged his own passions and those of his mercenaries, upon whom he depended for support, without restraint and limitation. At length, however, the association of the two Cæsars restored new vigour to the Roman arms; and the conduct of the British war was committed to the brave Constantius. His first enterprise was directed against Boulogne, which after an obstinate defence surrendered, A. D. 292; and thus a considerable part of the naval strength of Carausius fell into the hands of the besiegers. During the three years which Constantius employed in preparing a fleet adequate to the conquest of Britain, he scoured the coast of Gaul, invaded the country of the Franks, and deprived the usurper of the assistance of these powerful allies. Before these preparations were

finished, Constantius received information of the death of the tyrant, who was murdered, A. D. 294 (says Gibbon) or A. D. 293 (Blair's Tables) by his first minister Allectus. See ALLECTUS. Crevier's Rom. Emp. vol. ix. Gibbon's Hist. vol. ii.

CARAWAWANG *Point*, in *Geography*, the east point of the bay of Batavia in the island of Java.

CARAWAY, in *Botany*. See CARUS carui.

CARAWAY, in *Agriculture*, a plant sometimes cultivated for the seed. It is a sort of crop much cultivated in Essex on rich old leys of a strong clayey or loamy nature, in low situations. It is sometimes sowed with coriander and teasel, and harvested the second year at the expense of four shillings an acre. It is commonly threshed upon a cloth in the field, being very apt to fall in gathering, which is done the beginning of July. It commonly requires two good hoeings; one in April, the other in the beginning of June. The produce of this crop has often been very great, even as much as twenty hundred weight per acre, which has always a market in London; but sometimes as low as 12s. and frequently as high as 50s. on an average, 24s. or 26s. per hundred weight. It does not perfect its seed till the second or third year, when the land is fit to be ploughed up for wheat. For this crop the land should be prepared by two or more ploughings, and have a portion of manure applied where poor. See CARUS.

CARAXERON, in *Botany*. Vaill. act. 1722. p. 264. See ILLECEBRUM *vermiculatum*.

CARAZOWINY, in *Geography*, a river on the east coast of South America, between the river Cauoya to the E.S.E. and Uracho to the W.N.W. It large and navigable; but visited chiefly by a few Dutch ships, who come hither to load a kind of dyers' wood.

CARBACA, or GARBACA, in *Ancient Geography*, a town of Asia, in Paropamisus. Ptolemy.

CARBANA, a town of Asia Minor, in Lycia. Steph. Byz.

CARBANIA, a small island of the Mediterranean, between Sardinia and the continent of Italy. Pomp. Mela. Some have thought that it is the *Barpona* of Pliny, and the modern *Carboli*.

CARBANTORIGUM, a town in the northern part of Britain, which, according to Ptolemy, belonged to the Selgovæ. Horsley places it at Bardanna on the river Nith, above Dumfries, and Camden at Carlaverock, below it; and it was therefore probably situated where Dumfries now stands, or a little below it. The name seems to be derived from "Caer vant o rig," a town near the mouth of a river. Baxter places it at Melrofs.

CARBASA *Caryssia*, a term used by many of the ancient writers to express pieces of cloth made of the *linum incombusibile*, or asbestos stone, which being found plentifully about Carystium, was thence called by the name of the place. Pausanias calls it *linum Carpasum*, for the same sort of reason; Carpasus, a town in the island of Cyprus, being a place famous for affording large quantities of the stone in its neighbourhood.

CARBATIA, in *Ancient Geography*, a place of Italy in Liguria, at a small distance south of the Padus, or Po.

CARBENSIS *aqua*, in the *Materia Medica*, the name of a mineral water of Germany, of which Hoffman from Petzlerus has given the following account. All about the place of its origin, and along the canals through which it passes, it deposits an earthy and ferruginous matter, which concretes into a stony hardness. When any alkaline liquor, whether fixed or volatile, is added to these waters, they become turbid, and precipitate a whitish earthy matter to the bottom

bottom of the vessel; after the evaporation of the water they leave a *sal enixum*, and an alkaline earth; two quarts of them yield two scruples and ten grains of the earth, and twelve grains of the salt. If it be kept for any time in a glass, or earthen vessel, it deposits a sediment of a yellow ochreous earthy matter, and when immediately taken from the spring, it changes to a bluish brown colour, on being mixed with galls. It contains a very large portion of a subtil mineral spirit; for if a long-necked vessel be filled half full with it, and the orifice stopped with the thumb, the whole, on a little shaking, sends up a froth to the top; and when the thumb is taken off, the water squirts out to several feet distance. It makes an effervescence on mixing oil of vitriol with it; but this lasts but a very little time. From the whole, it seems to contain a large quantity of calcareous earth, and some small portion of ferruginous matter; whence it purges both by stool and urine, though mostly the latter way: the former operation, which is pretty constant, is owing to this alkaline earth meeting with an acid in the *prima via*, and being by it changed into a bitter purging salt, of the nature of Glauber's.

CARBEQUI, or *Asper of copper*, a coin which is current in the province of Georgia in Asia; particularly at Teflis, the capital. Forty carbequis are equal to the "abagi," and ten carbequis to the "chaouri."

CARBERRY, in *Agriculture*, a name applied, in some places, to the gooseberry.

CARBERY, in *Geography*, the name of a large barony in the S.W. of the county of Cork, province of Munster, Ireland. The district of this name formerly included some of the adjoining baronies, and is supposed to have been so called from an Irish prince who governed it. It is still the largest barony in Ireland, containing 39 parishes, and 196,321 Irish plantation acres, which is more than many counties. It has, therefore, been found convenient, in managing county business, to divide it into East and West Carbery. It is a very wild, mountainous, unimproved country, with a bold rocky coast, and many harbours.

A Latin poem of dean Swift's, called "*Carberia rupes*," was written in 1723, whilst on a visit to a clergyman in this barony. Dr. Smith, who made more than once the same little voyage along the coast which the dean had done, observes that the dean's descriptions were as just as his numbers were beautiful. The poem, and a translation of it by Dr. Dunkin, may both be seen in Smith's History of Cork, from which this article is principally taken. In some parts of Carbery the linen manufacture is successfully carried on, especially about Dunmanway and Cloghnakilty. Carbery, or Carbury, is also the name of two other baronies, one in the county of Sligo, and the other in the county of Kildare.

CARBERRY, a small island in Dunmanus bay, county of Cork, Ireland, which shelters vessels from westerly winds, but has shoals in its neighbourhood, which require attention to guard against. It is sometimes called *Innis Carbery*. N. lat. $51^{\circ} 31'$. W. long. $9^{\circ} 34'$. M'Kenzie, Beaufort.

CARBET ST. JAMES, a town of Martinico, in the West Indies. N. lat. $14^{\circ} 39'$. W. long. $61^{\circ} 10'$.

CARBI, in *Ancient Geography*, a people of Arabia Felix, according to Diodorus Siculus.

CARBIA, a place in the island of Sardinia, on the route from Tibula to Sulci. Anton. Itin.

CARBINA, a place of Italy in Japygia, mentioned by Athenæus, who says that it was taken by the Tarentines.

CARBINI, in *Geography*, a town of the department of Liamone, (island of Corsica), and chief place of a canton in

the district of Sartene; 5 miles E. of Tallano. The canton contains 2806 inhabitants.

CARBO *aquaticus*, in *Ornithology*. See PELECANUS *Carbo*, the Corvorant.

CARBON, in *Chemistry*.

§ 1. Of Carbon.

This substance abounds largely in all vegetable and animal bodies, as well as in the mineral kingdom, yet it is of very rare occurrence in a state of absolute purity. When uncombined with any foreign matter, it is transparent, colourless, intensely hard, and crystallized; and, both on account of its beauty and value, is placed at the head of the gems under its commercial and mineralogical name DIAMOND.

Diamond was formerly supposed to be incombustible, and the first hint at its real nature was given by Newton. This philosopher having observed that inflammable bodies possess, in proportion to their density, a greater power of refracting the rays of light than any other substances, was induced to rank the diamond among them, on account of the eminent degree in which it possessed this property. This conjecture was verified, in 1691, by the members of the Academy del Cimento at Florence, who consumed several diamonds by placing them in the focus of a lens. Francis I. emperor of Germany, afterwards witnessed the destruction of several more by the heat of a furnace. These experiments were repeated by Macquer, Rouelle, Darcet, and Cadet, who ascertained, that by the concurring action of air and heat, diamond was not only evaporated, but actually burnt with flame; they also proved that when the air was excluded the highest heat of a furnace produced little or no effect on this substance.

In 1772, an experiment was made by Lavoisier, which may be considered as the first attempt to effect a chemical analysis of diamond. He burnt a few grains of this substance in a jar of common air, confined over mercury, by means of a very powerful lens, and found that the pure part of the air had disappeared, as well as a considerable proportion of the diamond, and that the residual air abounded with carbonic acid: repeating the same process only with the substitution of an equal weight of highly burnt charcoal, he found precisely analogous effects to take place, and therefore concluded that diamond and charcoal in their chemical essence were very similar to each other. In 1785, M. Morveau discovered that diamond, when dropped into melted nitre, burns like charcoal, and without leaving any residuum. This fact suggested to Mr. Tennant a method of analysing diamond, which was effected with complete success. Into a gold tube, closed at one end, and terminating at the other in a curved glass tube, were put a quarter of an ounce of nitre and $2\frac{1}{2}$ grains of diamonds; the tube was then kept at a full red heat for an hour and a half, and when its contents were afterwards examined, the diamonds were found to have entirely disappeared, and the nitre was changed into sub-carbonat of potash; to a solution of this salt muriat of lime was added, and thus the carbonic acid was transferred to the lime: from this carbonat of lime the carbonic acid was expelled by means of the muriatic acid, and was found to amount to 9.03 grains. Hence 27.6 parts of diamond and 72.4 of oxygen constitute 100 of carbonic acid. But, according to Lavoisier, 28 parts of charcoal, and 72 of oxygen constitute 100 of carbonic acid; therefore diamond and pure charcoal may be considered as chemically the same.

Morveau has since endeavoured to invalidate the experiment of Mr. Tennant, and to shew that diamond is pure carbon and that charcoal is an oxyd of carbon, but his experiment is so manifestly incorrect as to merit no sort of confidence.

A further proof of the analogy between charcoal and diamond is furnished by an ingenious experiment of Clouet's, in which

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which some pure bar iron being exposed to a high heat, in contact with diamond, this latter substance was found to have disappeared, and the iron to be converted into steel.

But though diamond is the purest form of carbon, yet its high value, its hardness, and density, forbid it to be used in ordinary chemical experiments; all the succeeding facts, therefore, relate to that less pure kind of carbon which is obtained by exposing common CHARCOAL, or, still better, lamp-black, to a high heat in close vessels.

Carbon, or prepared charcoal, is an excellent conductor of galvanism and electricity, but transmits caloric with very great difficulty; a short piece may be held by one end while it is heated red at the other, without conveying any notable warmth to the hand.

It is insoluble in water, and even the combined action of air and water produces hardly any perceptible effect upon it; hence it is that stakes of wood that are charred on the outside will last much longer without rotting than the soundest timber that has not undergone this preparation.

Charcoal is not fusible by the greatest heat that can be applied: if exposed to a very high temperature in close vessels it loses little or nothing of its weight, but shrinks in size, and becomes proportionably more compact, dense, and sonorous, and acquires a deep velvet black colour. But though charcoal is unalterable by mere heat, yet when heated red in the open air, it speedily undergoes combustion, and is converted into CARBONIC ACID; pure oxygen gas produces, as might be expected, a much more powerful effect on this substance than atmospheric air does; a piece of charcoal barely heated at one end to redness and plunged into this gas, immediately burns with an intensely white glow, and is rapidly changed into carbonic acid.

Water, although it is, as we have already mentioned, incapable of dissolving carbon, is yet very obstinately retained by it, partly on account of its porous texture, and in part probably on account of a strong mutual affinity subsisting between them. When, however, charcoal is red hot, or nearly so, it decomposes any water with which it may happen to be in contact, and unites with both the elements of this substance; producing with the oxygenous base, according as this is added to saturation or not, carbonic acid and carbonous oxyd; and with the hydrogenous base forming a heavy inflammable air, called carburetted hydrogen or hydro-carbonat.

Newly prepared charcoal is capable of absorbing various gases, with remarkable facility, and in considerable proportions. This fact had been observed by Fontana, Lаметherie, Priestley, Scheele, and Morveau, but the first important series of experiments on this subject was published by Morozzo, since which time Messrs. Rouppe and Van Noorden of Rotterdam have made a considerable and very valuable addition of facts on this curious subject. The charcoal for the experiment being highly ignited in an open fire, to expel all the moisture and gaseous substances which it may contain, is quickly removed, and extinguished by being plunged under mercury, or inclosed in an air-tight metallic box; when quite cool it produces the following effect on the various gases.

One part of charcoal is capable of absorbing three times its bulk of atmospheric air in four or five hours; of oxygen gas there is absorbed, at first rapidly, and afterwards more slowly, 2.8 times the bulk of the charcoal. Azet and hydrogen are taken up instantaneously, but only in the proportion of 1.6 of the former, and 1.8 of the latter. Of nitrous gas 8.5 parts are very slowly, and of carbonic acid 14.3 parts are very rapidly absorbed. The gases thus taken up undergo no change except of form, nor are the residues

at all altered, and they may be all again separated from the charcoal by distillation, at the temperature of boiling water. If charcoal saturated with hydrogen in the way described is introduced into oxygen gas, or even into atmospheric air, a considerable absorption of the oxygen takes place, and combines with the hydrogen, forming water, and at the same time the temperature rises to about 100° Fahr. The result is the same if the experiment is inverted, that is, if charcoal charged with oxygen is introduced into hydrogen gas. Charcoal saturated with hydrogen is even capable of decomposing nitrous gas, the oxygen being absorbed and the azot alone remaining in the elastic state. Charcoal saturated with azot is also capable of decomposing atmospheric air, by abstracting the oxygenous part, which is a remarkable proof how adverse the gaseous state is to chemical combination.

Carbon is capable of combining with sulphur; the substance hence resulting is called carburetted sulphur, and almost all that is known as yet concerning it is due to the united investigations of Clement and Desormes, two French chemists. It is thus prepared. Fill an earthenware tube with small pieces and powder of newly burnt charcoal, fix it in a slanting direction in a furnace, and lute to the lower end a glass tube, dipping it into some water contained in a receiver. Fasten a glass tube also to the upper extremity of the earthen pipe, and fill it with short cylindrical pieces of sulphur, and fit a cork to the open end of the glass tube with a moveable wire passing through its centre, by which the pieces of sulphur may be pushed at pleasure towards the earthen pipe. The apparatus being completed, heat the pipe very gradually, and as soon as the gas casually contained in the charcoal is driven out, cause the sulphur, by means of the wire, to approach the heated part of the apparatus. Allow it to remain at such a distance that it may melt as slowly as possible, and run down among the charcoal; and if these precautions are duly observed, a yellowish oily liquor will soon be perceived in the terminating glass tube, which will drop into the water of the receiver, and collect at the bottom of the vessel, without at all uniting with the supernatant fluid. The carburet of sulphur thus obtained is a transparent liquid, colourless when pure, but generally of a yellowish-green tinge, and of a disagreeable slightly pungent odour, differing, entirely, however, from that of sulphuretted hydrogen. The specific gravity of carburetted sulphur is about 1.3. It evaporates in the air with nearly the same rapidity as ether, and, like this fluid, sinks the thermometer during the process in a remarkable degree. If it is put into an air-pump, and the atmospheric pressure be reduced to about nine inches of mercury, the carburetted sulphur begins to assume the form of a gas; but upon restoring the common pressure, this gas will immediately again resume its liquid state. It takes fire upon the application of a flame, and burns like alcohol, giving out at the same time a sulphureous odour, and depositing both sulphur and carbon. When kept for some time in a vial with atmospheric or azotic gases, it is dissolved by them in small proportion, and renders them inflammable. It combines with nitrous gas, and the mixture burns like zinc. When dissolved in oxygen gas, the result is an air that explodes with such prodigious violence as to render it dangerous to set fire to even a few ounce measures at the same time. In the state of vapour it combines slowly with the caustic fixed alkalis, forming with them deep amber-coloured solutions. By alcohol it is reduced to a soft pasty consistence. It dissolves very easily in cold olive oil, or in ether, deposits a little charcoal, and then assumes a crystalline form.

Carbon is said by Proust to be capable of uniting with phosphorus,

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phosphorus, but this, from subsequent experiments, appears to be a mistake.

Two of the metals are known to unite with charcoal; when combined with IRON the product is called steel; and with COPPER it forms a peculiar substance, first noticed by Dr. Priestley, and named by him charcoal of copper.

The action of the alkalis upon charcoal has been but little examined into; it is certain, however, that caustic potash, by long digestion with this substance, becomes coloured and partly carbonated.

The undecomposable acids appear to have no action on charcoal, but the decomposable ones are deprived by it of their oxygen, either entirely or in part, and the charcoal is changed into carbonic acid; thus phosphoric acid and charcoal yield, by ignition, phosphorus and carbonic acid; sulphuric acid and charcoal yield sulphur, sulphurous acid, and carbonic acid. If highly dried and finely pulverised charcoal is poured into recently prepared oxymuriatic acid gas; as soon as the two substances come into contact the charcoal becomes red hot, and falls to the bottom of the vessel, like a shower of fire.

The neutral and earthy salts with decomposable acids are remarkably changed at a red heat by charcoal: the others suffer no perceptible alteration. Thus the sulphates are converted into sulphurets, the nitrates become carbonates, while the muriates and fluates remain unchanged.

The metallic salts are all of them decomposed by charcoal at a greater or less degree of heat, in consequence of the deoxygenation of their bases, independently of the action of this substance on their acids.

The effects of charcoal in clarification are both curious and important. They were first noticed by M. Lowitz of Petersburg, and have for the most part been amply confirmed by succeeding observers, although the precise cause of these remarkable changes has not been satisfactorily ascertained. All that is essential for this purpose is, that the charcoal should be in fine powder and very dry; hence the only preparation requisite is to pulverize some well burnt common charcoal, and then heat it in a covered crucible to a glowing red, till it ceases to give out an inflammable vapour. If it is not employed immediately, it ought to be kept in a ground stoppered glass bottle, and may then be preserved unimpaired for any length of time. The effects of this prepared charcoal are very striking. Being mixed with common vinegar, or any kind of wine, a thick froth rises to the surface, and the liquors, after filtration, are found to be as limpid as water. The filthiest and most putrid ditch-water is in like manner rendered perfectly clear, inodorous and insipid; and rancid oils are also deprived of their smell and taste by repeated filtration through this prepared charcoal. Hence also its peculiar efficacy as a dentifrice; it is sufficiently hard to remove the concretions from the teeth without injuring the enamel, while it neutralizes and entirely destroys for a time any foetor which may arise from a carious tooth.

§ 2. *Of carbonous oxyd, or gaseous oxyd of carbon.*

Dr. Priestley was the first person who effectually called the attention of chemists to this substance; but for a correct acquaintance with its nature and properties we are indebted to Mr. Cruickshank. It had always been objected by Dr. Priestley, against Lavoisier's hypothesis of the constitution of fixed air, that when charcoal, however dry, was distilled with scales of iron, or the red oxyd of mercury, the product was not only carbonic acid, but a large quantity of a heavy, inflammable air, resembling, in many respects, carburetted hydrogen, and supposed by Dr. Priestley to be actually this very gas. Now carburetted hydrogen consists of hydrogen, holding carbon in solution; and if it were really produced

by the mutual action of carbon and a metallic oxyd, could only be accounted for upon the Lavoisierian theory by the casual presence of some water. But the gas is produced in such great abundance, even when the materials have separately been first exposed to a very high heat to drive off every atom of water, that this hypothesis is untenable; it is, therefore, an obligation of no trifling kind that the modern chemical theory is under to Mr. Cruickshank, for having shewn that this gas, though inflammable, does not necessarily contain any hydrogen whatever, but has only a simple combustible base, namely, carbon, and differs from carbonic acid merely by its smaller proportion of oxygen. Hence, it is properly called an oxyd of carbon, and bears the same analogy to carbonic acid as the nitrous oxyd does to the nitric acid. The experiments of Mr. Cruickshank have been repeated with much apparent accuracy by Messrs. Clement and Desormes, and the results obtained by them correspond very nearly with those of the former chemist.

The gaseous oxyd of carbon may be produced either by the partial oxygenation of carbon, or the partial deoxygenation of carbonic acid, or the solution of carbon in carbonic acid, on each of which methods we shall proceed to say a few words.

The original experiment by Dr. Priestley is the following. Equal parts of scales of iron and charcoal (each having previously been ignited in separate vessels), were put into a glazed earthen retort and strongly heated. In a short time, a prodigious quantity of air came over, which, on examination, was found to consist of one tenth carbonic acid, and the remainder was "an inflammable air of a very remarkable kind, being quite as heavy as common air. The reason of this," Dr. Priestley adds, "was very apparent, when it was decomposed by dephlogisticated air, for the greater part of it was fixed air." The above two important properties, namely, the weight of this gas and its almost total convertibility into carbonic acid by oxygen, are fully confirmed by subsequent experiments.

Mr. Cruickshank, in repeating this experiment of Dr. Priestley, found, that as soon as the retort was red, abundance of gas came over, which, being examined at different periods, was found, in the beginning of the process, to be composed of one part of carbonic acid and four of carbonous oxyd, with a small admixture of carburetted hydrogen; after this, to the end of the process, the proportion of carbonous oxyd gradually increased to about six-sevenths of the whole. Two ounces of the materials afforded many gallons of the gas.

The sublimed oxyd of zinc was next substituted to the iron scales, and distilled in the same manner with charcoal. Even before the retort became red much gas was given out, and, on increasing the heat, it came over in torrents. It contained a much smaller proportion of carbonic acid than the former, and, towards the end, consisted of pure oxyd of carbon. Part of the zinc was found, in the metallic state, sublimed into the neck of the retort. In like manner litharge, the grey oxyd of manganese, and the red oxyd of copper, produced with charcoal, first, a mixture of carbonic acid with carbonous oxyd, and, at last, the inflammable gas in a state of purity.

The distillation of charcoal and the sublimed oxyd of zinc was repeated by Clement and Desormes, with particular attention to the quantity of products from a given weight of materials. The charcoal and zinc were first heated separately, and examined. Common charcoal, when heated strongly, gave a considerable quantity of inflammable gas, and about $\frac{1}{60}$ th of its weight of water. After an hour nothing further came over; so that, to ensure the purity of the

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the charcoal, it should be used hot from the crucible or other vessel in which it has been exposed to a full red heat for half an hour. The oxyd of zinc gave out nothing at all by being heated *per se*; so that it may at any time be considered as pure, when previously free from accidental moisture.

It was found, by experiment, that 14.36 parts of zinc increased, by calcination, to 17.48 of white sublimed oxyd; and hence it is inferred that 100 parts of white oxyd consist of 82.15 metal, and 17.85 oxygen. Pure charcoal, prepared as above, was mixed, to the amount of 30 grammes, (463 grains) with an equal weight of oxyd of zinc, which were put into a coated glass retort, communicating with lime-water, through which all the gaseous products passed. When first heated, a small portion of carbonic acid gas appeared, rendering the lime-water turbid; but this soon ceased, and the gas was purely inflammable. In five hours the production of gas had entirely terminated, and the total products of the operation were as follows:

	Grammes.
Zinc sublimed in the retort - - -	21.82
Charcoal remaining - - -	26.60
Carbonic acid - - -	0.07
Nine litres (16.9 wine pints) of inflammable gas	10.35
	58.84
Loss -	1.16
	60.00

In all the preceding experiments the carbonous oxyd was obtained by the partial deoxygenation of the metallic oxyds and the consequent oxygenation of the carbon. In those which we are about to relate, the same gas was procured by inverting the process, that is, by depriving carbonic acid of a portion of its oxygen.

Dr. Priestley, having obtained an inflammable gas, by heating together carbonat of barytes and magnetic oxyd of iron, Mr. Cruickshank was induced to vary the experiment in the following manner. Equal parts of chalk (heated red hot previously for ten minutes), and of iron filings were mixed together, and heated in an earthen retort, abundance of gas was given out, consisting pretty uniformly of one part carbonic acid and five of carbonous oxyd.

An ounce of chalk previously heated red for ten minutes, was mixed with an equal weight of zinc filings, and heated gradually in a coated glass retort. A little carbonic acid came over at first, but mixed with oxyd of carbon; and when the contents of the retort were thoroughly red, nothing but the inflammable gas came over, and that in prodigious quantity. It was examined at different periods of the distillation, and proved to be wholly unmixed with carbonic acid. After the process, the retort being examined, there was found some sublimed oxyd of zinc in its neck, below which was some metallic zinc, and at the bottom was a mixture of oxyd of zinc, and partly caustic lime. Chalk, with tin filings, gave a similar result.

In these experiments, the carbonic acid was united to an earthy base before distillation, and consequently was exposed to the deoxygenating effect of the metallic filings in its nascent state, or, at the moment of its assuming the gaseous form, a state in which airs of all kinds are peculiarly susceptible of chemical change. Mr. Cruickshank found, however, that carbonic acid, even in the elastic state, was also susceptible of being deoxygenated by the same means, though not quite so easily. For this purpose, some dry chalk was in-

troduced into an iron retort, over which was rammed some dry sand, and a stratum of iron-filings over all. In this arrangement, the carbonic acid gas expelled from the chalk had to traverse a stratum of sand three inches thick, before it could reach the iron-filings. The gaseous products of the distillation were a quantity of undecomposed carbonic acid, together with a large proportion of the inflammable gas, and the iron-filings were taken out considerably oxydated. The decomposition of carbonic acid by metals does therefore take place, when the acid is in the gaseous form, but by no means so perfectly as when in its nascent state. A similar decomposition was also effected by forcing the same carbonic acid gas successively backwards and forwards through an iron tube, the middle of which was full of iron-filings, and kept red hot by a small furnace placed beneath it. A bladder was tied to each end of the tube to receive the gas, and, by passing it twenty times slowly through the tube, two thirds of it were converted into inflammable gas.

It is obvious, that if to any base, already united with oxygen, we add a fresh portion of the base, it will have the same relative effect as abstracting part of the oxygen; and this offers another mode of preparing carbonous oxyd, which has been successfully practised by Messrs. Clement and Deformes. Pelletier had previously discovered that though the native carbonat of barytes is scarcely calcinable, *per se*, in any fire, yet it will readily part with its acid by calcination, if previously ground to fine powder, and mixed with a little charcoal. The chemists above-mentioned, on repeating this experiment with three parts of carbonated barytes and one of charcoal, obtained a large quantity of gas, composed of about $\frac{5}{6}$ carbonous oxyd, and $\frac{1}{6}$ carbonic acid, and the barytes remaining in the retort was found to be quite caustic. Here, therefore, it is to be supposed, that the carbonic acid is superaturated with its own base, and thus rendered much more volatile than before.

A more direct combination of carbon with carbonic acid was also obtained by the two associated chemists just mentioned, with precisely the same apparatus as that used by Mr. Cruickshank for passing carbonic acid gas over red hot iron, except that the tube was filled with pulverized charcoal instead of iron-filings. The first sensible effect produced on the gas was a considerable dilatation, exclusive of the mere expansion by heat, and arising from the solution of a part of the heated charcoal in the gas as it passed over. After each experiment, by far the greater part of the carbonic acid was changed into the inflammable gaseous oxyd of carbon, the residual carbonic acid not amounting to more than from $\frac{1}{15}$ th to $\frac{1}{10}$ th of the whole. The remaining charcoal being taken out and weighed was found to be considerably diminished; but the proportional loss was uniformly greater in tubes of iron, than of glass or porcelain, doubtless on account of part of the carbon being combined with the iron, and thus converting it internally into steel. The composition of the gaseous oxyd, into which the carbonic acid was changed, calculated from the amount of charcoal taken up by it in porcelain tubes, appears to be about 53 of oxygen, and 47 of carbon.

The properties of pure carbonous oxyd, prepared from chalk or carbonat of barytes, and filings of iron or zinc, are the following. It is lighter than atmospheric air, in the proportion of 22 to 23. Hence, its specific gravity (that of water being 1000), will be 1.177, while that of atmospheric air is 1.2308; hence, it materially differs from carburetted hydrogen, the weight of which is not more than half that of common air. It suddenly destroys animal life.

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It is in no degree altered by being electrized, *per se*, for a considerable length of time. It burns in the open air with a quiet, blue flame. When previously mixed with common air and kindled, it does not explode but burns slowly: when mixed with oxygen gas, and fired by the electric spark it explodes, but not very violently, and gives out a red flame. If a small jet, communicating with a reservoir of this gas, be set fire to, and introduced into a large balloon receiver filled with oxygen gas, it is found to burn brightly for a time, and afterwards goes out. The gas remaining in the receiver is not greatly diminished, and the inside of the vessel, though somewhat damp, is by no means studded with those visible drops of liquid that characterize the combustion of hydrogen. The residual gas, on examination, will be found to consist of carbonic acid with some uncombined oxygen.

The relative proportions of carbonous oxyd and oxygen requisite to mutual saturation, and the consequent production of carbonic acid, are the means of ascertaining the exact constituent parts of this inflammable gas. When 20 measures of pure gaseous oxyd are mixed with eight measures of oxygen and exploded, the whole is reduced to 18 or 19 measures, and is entirely absorbable by lime-water; it is, therefore, carbonic acid. The weight also of this latter product is found to correspond, as nearly as can be expected in experiments of this kind, with the sum of the weight of its two ingredients before mixture. One hundred cubic inches of carbonous oxyd with 40 inches of oxygen produce 92 cubic inches of carbonic acid, and the weight of the first may be estimated at 30 grains, of the second at 13.6, and of the third at 43.2; the sum of the two first differing from the third only by 0.4 of a grain.

Hence it may be inferred, that 100 parts, by measure, of gaseous oxyd of carbon, require for saturation 40 measures of oxygen gas, and produce, by combustion, about 92 measures of carbonic acid gas; or, by weight, that 100 grains of carbonous oxyd require about 45.5 grains of oxygen, and are converted into 144 grains of carbonic acid, 1.5 grain being allowed for water and casual impurities. Now carbonic acid has been found by Lavoisier and other chemists to consist of 28 parts, by weight of carbon, and 72 of oxygen; consequently 144 grains of carbonic acid (the product of the full oxygenation of 100 grains of the inflammable gas), contain 40.32 grains of carbon; therefore the remainder of the 100 grains of the oxyd, i. e. 59.68 grains, must be oxygen. Hence, carbonous oxyd may be stated as composed of

40.32 carbon
59.68 oxygen
100.00

Or, by another calculation, 144 grains of carbonic acid contain 72 percent., or 103.68 grains of oxygen; but only 45.33 grains of oxygen were added to the inflammable gas to produce this carbonic acid, and, consequently, the difference between 103.68 and 45.33, or 58.35 grains of oxygen were already contained in the gas, leaving 41.65 grains, to complete the 100 grains of this gas, for carbon: hence, according to this calculation, carbonous oxyd consists of

41.65 carbon
58.35 oxygen
100.00

We may, therefore, reckon on an average, that 100 grains

of carbonous oxyd, obtained from the decomposition of the earthy carbonats by metallic substances in its purest possible state, unmixed with any hydrogen, are composed of about 41 of carbon and 59 of oxygen.

A true combustion of the gaseous oxyd of carbon takes place when it is mixed with oxymuriatic acid gas. If the latter be recently made and added to carbonous oxyd in due proportion, the whole mixture is converted into carbonic acid and simple muriatic acid; the carbonous oxyd having been fully oxygenated by the excess of oxygen in the oxymuriatic acid. The proper proportions for the complete success of this experiment are two measures of carbonous oxyd, and $2\frac{3}{4}$ measures of oxymuriatic acid. A mixture, thus proportioned, being kept for 24 hours in a ground stoppered vial, and, for further security, inverted in mercury, when opened in water will undergo an instantaneous absorption of about two-thirds, which is muriatic acid gas; the residue, by agitation with lime-water, will be taken up, with the exception of about $\frac{1}{16}$ th, which is a casual mixture of azot.

Oxyd of carbon, when heated with phosphorus, dissolves a portion, and then burns with a pale yellow flame. The phosphorus is neither deposited nor acidified by long standing, even when assisted by water.

The effect of hydrogen on the carbonous oxyd is very striking. When equal parts of these gasses are mixed together and passed through a glass tube made red hot, a complete decomposition takes place, the gaseous oxyd deposits its charcoal on the inside of the tube, which, being nearly melting, causes it to adhere, and to form a brilliant, uniform, black enamel; while the oxygen of the gaseous oxyd by union with the hydrogen forms water, which is condensed at the further end of the tube. Some of the hydrogen passes through apparently unaltered.

The decomposition of carbonic acid gas, by means of electricity, when in contact with mercury or any other easily oxydable metallic body, well illustrates the nature of carbonous oxyd. Dr. Priestley was the first who found a change to take place in carbonic acid gas by taking the electric spark in it repeatedly for a considerable time. Out of many experiments, the following may be selected. In a small tube containing about $\frac{1}{15}$ th of an ounce measure of carbonic acid, and standing over mercury, the electric spark was taken for the space of an hour; after which the whole tube was clouded by a pulverulent matter of a black colour in the upper part of the tube, but yellow at the bottom, like sulphur. This substance, on examination, proved to be oxyd of mercury. The air itself was a little enlarged, and about a fifth part of it was rendered insoluble in water.

The elegant experiments of Th. de Saussure have thrown much light on this subject. Electric sparks were taken for 18 hours in a glass tube containing 13 cubic inches of dry and pure carbonic acid gas and confined by mercury. After electrization much black oxyd of mercury was discovered; a very slight dilatation amounting to no more than $\frac{1}{16}$ th of a cubic inch was observed. On throwing up some caustic alkali no more than one cubic inch was absorbed, which was therefore carbonic acid; the next was very pure oxyd of carbon, for where 100 parts of it were burnt with about a third of oxygen gas no water was perceived, the product being merely carbonic acid.

Carbonic acid has also been decomposed by the same ingenious chemist by hydrogen, by aid of the electric spark. In a long glass tube were mixed together $3\frac{3}{4}$ measures of pure carbonic acid with an equal quantity of hydrogen, and the whole was electrized for twelve hours. A condensation took

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took place, considerable at first, but very trifling towards the conclusion of the process. A number of fine drops of water were deposited on the upper part of the tube, and the gaseous mixture was reduced in bulk from $7\frac{1}{2}$ measures to $4\frac{3}{4}$, of which one was undecomposed carbonic acid, and the remaining $3\frac{1}{4}$ were carbonous oxyd, containing a small admixture of hydrogen. In the above experiment the hydrogen appears to unite with part of the oxygen of the carbonic acid, to form the water, which is condensed, while the carbonic acid, by losing oxygen, passes to the state of carbonous oxyd.

A similar decomposition of carbonic acid by hydrogen also takes place when the mixed gases are passed through a red hot porcelain tube, and the gaseous oxyd is produced.

§ 3. Of hydrocarbonat, or carburetted hydrogen.

In the former section we have treated of the combination of carbon with a less portion of oxygen than is required for its acidification; in the present section we shall examine the phenomena attending the combination of carbon with hydrogen. Carburetted hydrogen, otherwise called *heavy inflammable air*, is an inflammable gas considerably heavier than hydrogen, but lighter than carbonous oxyd, or common air: it does not render lime-water turbid, when agitated with it, and by combustion with oxygen is totally resolvable into carbonic acid and water.

Before it was suspected that carbon could exist in any other state of oxygenation than carbonic acid, it might be inferred, with tolerable though not absolute certainty, that when any gas had been purified from carbonic acid by means of alkali or lime-water, if it furnished a fresh portion of this acid after combustion with oxygen, the carbonaceous ingredient existed in the state of pure carbon or charcoal. Therefore, as the only products of carburetted hydrogen, when burnt with oxygen, are carbonic acid and water, chemists generally satisfied themselves with estimating the quantity of carbon contained in the gas, by taking about 28 per cent. of the carbonic acid produced, and set down the entire remainder as hydrogen. For example, if 100 cubic inches of any gas, weighing 15 grains, were totally resolvable into carbonic acid and water, by combustion with oxygen; and if, by the combustion, 54 inches of carbonic acid, weighing 25 grains, were produced, the quantity of carbon originally contained in the gas would be reckoned to be seven grains, (being 28 per cent. of the weight of the carbonic acid,) and the difference between 7 and 15, or eight grains would be considered as the weight of the hydrogen; or, in other words, the gas would be called a carburetted hydrogen, consisting of hydrogen holding carbon in solution, in the proportion of eight, by weight, to seven of the latter.

But, it is obvious, that this mode of estimating must be totally erroneous in the case (probably very frequent), of a mixture of gaseous oxyd of carbon and hydrogen gas; and hence no approach to analysis can be obtained without ascertaining both the water and carbonic acid produced, and even then various causes of uncertainty will occur.

So that it is possible, and by no means improbable, that there may exist three species of gases, all of which have a claim to the title of hydrocarbonat, or carburetted hydrogen, namely, 1st. hydrogen, simply holding carbon in solution, or what corresponds with the original idea of a hydrocarbonate; 2d. hydrogen mixed with gaseous oxyd of carbon; 3d. a mixture of the two former species, or hydrogen and gaseous oxyd of carbon with an excess of carbon held in solution by one or both of these gases.

Carburetted hydrogen is obtained in a great variety of ways,

and with very considerable differences in specific gravity and the proportion of ingredients. It is found native on the surface of stagnant waters, marshes, wet ditches, &c. through which, if examined closely, large bubbles will be seen to rise in hot weather, and may be increased at pleasure by stirring up the bottom with a stick. In close, still evenings, if a candle be held over the surface, flashes of a blue lambent flame may be perceived spreading to a considerable distance. All that is not fabulous in the *ignis fatuus* is probably derived from this source. This species may be termed, for distinction, the carburetted hydrogen of marshes: in the purest form in which it can be collected it is usually mixed with about 20 per cent. of azot.

This gas is also given out very abundantly by almost every vegetable substance that is exposed to a dry heat sufficient for its decomposition. When heated in close vessels much more hydrocarbonat is obtained than by combustion in the open air, the product in this latter case containing more carbonic acid. It would be endless to enumerate the vegetable sources of this gas, but we shall mention some of the most convenient modes of obtaining it in a state of purity.

One of the commonest methods employed is the destructive distillation of the acetous salts. For this purpose, let a small proportion of dry acetite of potash be heated in a glass retort. The salt soon melts in its water of crystallization, puffs up, and, if the retort is too small, is very apt to come over into the neck. The first products are water and the air of the vessels; but, when the acetous acid begins to be scorched, a large stream of gas begins, and continues till the whole is red hot, and little else remains in the retort but carbonated alkali and a little charcoal. Along with the gas there arises much oil, which is condensed in the cool receiver. The gas, according to the analysis of it by Dr. Higgins, after the first portions have passed over, consists of nothing but hydrocarbonat and carbonic acid, which last may be separated by lime-water. The hydrocarbonat itself varies considerably. The first part is much heavier than the last, (though still lighter than common air,) and appears to hold in solution part of the oil; for, on standing some time over water, it becomes lighter, and is found to require less oxygen for saturation than before. The average specific gravity of the first and last gas mixed is to that of common air as two to three.

Carburetted hydrogen is obtained in great purity by sending the vapour of inflammable vegetable matter through an earthen or glass tube passing through a furnace, and kept red hot in the middle. The vapour of camphor, ether, alcohol, and other inflammables thus treated, is converted into this gas, but with much difference in quantity, according to the degree of heat and other circumstances.

Another method of obtaining carburetted hydrogen, is to put coal, wood, peat, &c. into any convenient vessel, an earthen or iron retort for example, and heat it slowly to redness.

Most animal inflammable substances, such as silk, fat, wax, and the like, yield this gas as freely as vegetable matter, by a similar treatment. This was discovered by Berthollet, in his masterly researches on the nature of animal matter and ammonia.

Carburetted hydrogen (or at least a gas that gives water and carbonic acid by combustion with oxygen), is also generated in abundance, when charcoal, without previous drying, is heated *per se* in close vessels, and continues to be given off till the charcoal has been in a state of full ignition for about an hour; after which it ceases, and the charcoal, as already mentioned, is rendered pure. A similar process of obtaining

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this gas, is to inclose powdered charcoal in a tube passing through a furnace, to confine the charcoal by a pellet of clay loosely fixed at each extremity of the tube, and in that situation to send through it the vapour of water kept boiling in a small retort attached to one end of the tube. Much carbonic acid gas is generated this way, and, when this is separated by lime-water, the residue is inflammable.

Lastly, this gas may be procured by the direct union of its constituent parts. If hydrogen gas is passed seven or eight times successively through an iron tube containing charcoal, and heated red hot, a diminution of bulk takes place, the hydrogen dissolves a portion of the charcoal, and then assumes the properties of carburetted hydrogen.

A curious variety of hydrocarbonous gas, was discovered by the associated Dutch chemists (Van Dieman, Troostwyck, and others) which is procured from ether or alcohol, and has the remarkable property of generating an oil when mixed with oxymuriatic acid gas. Hence it has been termed *oily carburetted hydrogen*, or *olefiant gas*. The mode of preparing this singular gas, and the enumeration of its distinguishing properties, will form the subject of the next section; it may, however, be observed here, that according to Mr. W. Henry's experiments, the olefiant gas appears also to be contained in part in the hydrocarbonat from coal, wax, and some other substances, and greatly to contribute to the quantity of light and heat which these gasses give out as well as to their large proportion of carbonic acid.

Carburetted hydrogen is singularly affected by the electric spark. Dr. Austin found, that on taking the electric spark repeatedly through this gas, obtained from acetite of potash, the bulk of the gas enlarged after every shock, and at length expanded to nearly twice its original dimensions. When examined after this expansion, it was found to be as inflammable as before, and judging from the test of lime-water no carbonic acid appeared to have been generated. Dr. A. concludes that the enlargement can only be owing to the production of a quantity of hydrogen, and makes some inferences which, however, have since been shewn by Mr. W. Henry to be erroneous. Mr. H. demonstrates that there is no destruction of carbon by this process, since the same quantity of carbonic acid is produced after as before electrization by the action of oxygen gas. He likewise makes it appear probable, that the water held in solution by the gas is the chief agent in its expansion, since when the gas has been dried by caustic alkali no continuance of electrization will enlarge it more than one sixth of its original bulk; but when the contact of water is admitted, the bulk is doubled by the same treatment. Perhaps the discovery of carbonous oxyd will explain this fact. It is not improbable that the carbon of the gas may unite with the oxygen of the water, and thus produce the carbonous oxyd which would not give any precipitate with lime-water, and the bulk of the gas would be enlarged both by the carbonous oxyd and the hydrogen of the water, as well as by the expansion which the hydrocarbonat would undergo after the carbon was separated from it, whilst the actual quantity of carbon remaining the same, as much carbonic acid would be separated by complete oxygenation as before electrization. It is not improbable that the affinities of hydrogen and carbon for oxygen are so nearly equal, that either substance is able *partially* to decompose the complete oxyd of the other. Thus we find, that when hydrogen and carbonic acid are together subjected to electricity, the carbonic acid is partially decomposed, and the product is carbonous oxyd and water, and on the other hand, when water is decomposed by red hot charcoal, a part of the product is also the carbonous oxyd.

All the hydrocarbonats are fatal to animal life; not at appears from the mere absence of oxygen, but from the presence of something positively noxious: since animals immersed in it die sooner than they would from the mere interruption of respiration.

This gas is scarcely if at all absorbed by water, but by long standing over it deposits a part of its carbon. This, however, applies only to those hydrocarbonats that require at least their own bulk of oxygen to saturate them, and especially to that variety called olefiant gas.

Simple carburetted hydrogen, when set fire to, burns at the surface in contact with the air with a blue flame with red edges, but when mixed with any of the olefiant gas the flame becomes much more brilliant, resembling that of oil. When applied to the purposes of illumination the hydrocarbonat from coal, from lamp-oil, or from wax, produces as much light in an Argand lamp as oil in substance does; this appears to be owing to the olefiant gas which they contain. The brightness of the flame is much diminished when these gasses have been kept over water, and hence for illumination they should be used as soon as prepared.

The combustion of hydrocarbonat is much more brilliant in oxygen gas, and the products if a sufficient quantity of oxygen has been used, are merely water and carbonic acid.

If any of the hydrocarbonats be mixed with oxygen gas and fired in a close vessel by the electric spark, or in any other way, an explosion takes place more or less violent according to the quantity of carbon contained in the gas, and the result of the decomposition is carbonic acid, together with any unconsumed gas or excess of oxygen, while the water is found condensed in drops on the sides of the jar. A single cubic inch of the mixed airs is generally as much as can be conveniently managed at each explosion, and when any olefiant gas is present even this small quantity will endanger very thick glass jars; a very vivid red flame appears at the moment of explosion, and a great instantaneous enlargement takes place, after which the bulk is suddenly reduced to much less than its original quantity. When the carbonic acid is absorbed, if the gasses have been properly proportioned, no gaseous residue is left except accidental impurities.

The oxymuriatic acid furnishes also a very useful method of decomposing and analysing all the hydrocarbonats. Mr. Cruickshank's beautiful and accurate experiments on this subject are highly instructive. The oxymuriatic acid gas was procured from oxymuriat of potash, by means of muriatic acid, and was used soon after being prepared, as it is in some degree altered by keeping.

Pure hydrogen and oxymuriatic acid gas were first tried; one measure of the former with two of the latter mixed in a glass vial with a ground stopper, and inverted over water were suffered to remain 24 hours. The stopper being then withdrawn, the water rushed into the vial, absorbing the whole of its gaseous contents, except about $\frac{1}{30}$ of the whole, which was azot, and doubtless a casual impurity.

The different hydrocarbonats were then tried. In a bottle filled with, and inverted over water, one measure of well washed hydrocarbonat from camphor was mixed with two of oxymuriatic acid. A slight cloud and trifling absorption were perceived at the time of mixture, after which the stopper was put in, and the whole was left at rest for 24 hours. When opened under water all the gas was absorbed, except 0.43 of a measure, and this was reduced by lime-water to 0.34. This residue was still inflammable, but burnt with a lambent blue flame like carbonous oxyd; and this

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this it was proved for the most part to consist of, by the large quantity of carbonic acid which it yielded when fired with oxygen; two parts of it with one of oxygen yielding no less than 1.7 of carbonic acid.

In the above experiment the mutual decomposition of the oxymuriatic acid and carburetted hydrogen, produces no less than four new compounds: namely, common muriatic acid by the loss of oxygen; water by the union of oxygen with hydrogen; carbonous oxyd by the partial oxygenation of some of the carbon; and carbonic acid by the complete oxygenation of the remainder.

On increasing the quantity of oxymuriatic acid to about four times that of the carburetted hydrogen, the whole of the carbon was now found to be completely oxygenated, and every thing was absorbed by water or lime-water; the products were therefore only muriatic and carbonic acids and water.

Mr. Cruickshank found a very considerable difference in the quantity of carbonic acid produced, and of course in the carbonaceous ingredient in the hydrocarbonats from camphor, ether, and alcohol, when they had been long kept over water or agitated with it. A similar difference in the quantity of combustible matter was observed by Dr. Higgins, in the hydrocarbonat from acetite of potash, which renders it highly probable that these hydrocarbonats hold in solution somewhat of an oily ethereal vapour, or a portion of true olefiant gas which water will absorb. This also, it probably is, which causes the slight diminution which some of the hydrocarbonats immediately experience when mixed with oxymuriatic acid gas; for with pure olefiant gas the diminution is great and immediate, as we shall presently mention. When oxymuriatic acid gas and carburetted hydrogen are mixed in the proportion of two of the former to one of the latter, and the mixture is exploded by the electric spark, a copious deposition of charcoal takes place, but when oxymuriatic acid gas is used in a larger quantity, the whole of the carbon is converted into carbonic acid. This separation of charcoal takes place only with the hydrocarbonats from camphor, ether, and alcohol, and even in these this property is lost by being kept some time over water.

Carburetted hydrogen is also readily decomposed by sulphur; the carbon being precipitated in form of a black powder, and the hydrogen uniting by preference with the sulphur forming hepatic gas. This may be most conveniently effected by making sulphur red hot in an earthen tube and then passing the carburetted hydrogen through it.

§ 4. Of olefiant gas.

The discovery of this singular species of carburetted hydrogen is due to some associated chemists of Amsterdam, (Van Dieman, Van Troostwyck, Bondt, and Lawrenburgh,) and originated in their examination of the different products of the distillation of sulphuric acid and alcohol, in the preparation of ether. In the common process this gas appears towards the latter end of the distillation accompanied by the *oil of wine*; but in order to procure it immediately, for the purpose of experiment, nothing more is necessary than to put into a proof bottle a little rectified alcohol, and four times its weight of strong sulphuric acid; much heat is given out on mixture; the colour becomes first brown, and then black, and on the application of a gentle heat the gas in question is produced in vast abundance, and may be collected in jars inverted over water. The only foreign matters with which the gas is mixed are sulphureous acid, and a little ether, but these may be got rid of by washing it with some very dilute liquid ammonia, and then the olefiant gas remains pure.

When thus prepared it exhibits the following properties. Its specific gravity is to that of atmospheric air, as 905 to 1000. Its odour is very fetid. It burns with a dense flame, like an oil or resin. It is not absorbed nor altered by water, nor is it affected by any of the common reagents, whether gasses, alkalies, or acids, except the oxymuriatic acid gas. Equal parts of these gasses being mixed together, an immediate diminution of bulk takes place, a visible vapour fills the vessel, much heat is given out so as to be very sensible even to the hand, and at the same time a thick pearl-coloured oil appears in drops on the surface of the water, over which the mixture is made, and immediately sinks to the bottom.

It is from this singular production of dense oil, with the oxymuriatic acid, that this species of carburetted hydrogen has acquired the name of *olefiant* or *oil making*. When these two gasses are mixed in the proportion of four of oxymuriatic acid to three of carburetted hydrogen, the whole is absorbed, except accidental impurities.

The oil thus generated is heavier than water, whitish, and semi-transparent. By keeping it becomes yellow and limpid; its odour is highly fragrant and penetrating; its taste is somewhat sweet. It is sparingly soluble in water, to which it communicates its peculiar odour. Caustic potash has no effect on the oil, but separates the adhering muriatic acid and renders it more fragrant.

The constituent parts of olefiant gas appear to be only carbon and hydrogen, but it contains a larger proportion of the former than the common hydrocarbonats do. It is decomposed by sulphur like the other hydrocarbonats.

The combustion of this gas offers some curious circumstances. When an Argand lamp is supplied with it instead of oil, the flame far exceeds every oil and hydrocarbonat in beauty and brilliance. When mixed with oxygen gas, and detonated by the electric spark, the explosion is much more violent than that of common carburetted hydrogen. Mr. Henry found that a strong glass tube was shattered with only 0.3 of a cubic inch of olefiant gas, and 0.17 of oxygen; but when the quantity of oxygen is considerably below that required, for the complete saturation of this gas, only a very trifling explosion is produced.

Another singular property of olefiant gas is the copious deposition of charcoal, when it is mixed with a small quantity of oxygen or oxymuriatic acid gas and kindled. After the mixture of the olefiant and oxymuriatic acid gasses, two or three minutes elapse before the oil thus generated is entirely precipitated, but if this mixture is immediately set fire to there is no production of oil; but in its stead so copious a deposition of charcoal takes place, that the whole vessel is obscured, as if it had been lined with lamp-black.

A similar deposition of carbon takes place when the olefiant gas is mixed with just enough of oxygen to begin the combustion. If two parts of the latter are mixed with 1½ of the former, and the mixture set fire to by the electric spark, a copious deposition of carbon ensues.

The great excess of carbon contained in olefiant gas is also manifest from the large proportion of oxygen required for its saturation, amounting to 2.84 to one, estimating each by bulk.

Olefiant gas has also been procured by the Dutch chemists, above named, not only from alcohol and sulphuric acid, but by passing the vapour of alcohol or ether through a red hot earthen tube. In this case, however, the olefiant gas appears to be mixed with a little carburetted hydrogen. It is remarkable, that if a glass tube be used instead of an earthen one, the gas is no longer olefiant, but only simple carburetted hydrogen; but if the glass tube is filled with either

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either alumine or flint the same effect is produced as with the earthen tube; on the other hand, when lime either pure or carbonated, or magnesia, were substituted to the two other earths, the gas was common carburetted hydrogen.

The whole of this very interesting part of chemistry requires further examination, especially as far as regards the formation of carbonous oxyd.

CARBON, in reference to *Husbandry* and *Gardening*, a matter obtained from different animal and vegetable substances, by means of a slow and confined combustion. This substance is charcoal in its pure state; that which is commonly met with containing a portion of incombustible earth, and some saline matter in union with the carbon. See CARBON and CHARCOAL.

The author of the "Philosophy of Agriculture and Gardening," remarks, "that when animal and vegetable bodies are burnt without the access of air, that is, where their volatile parts are sublimed, there remains a greater quantity of charcoal, a much greater in vegetable bodies than in animal ones. This is termed carbon by the French school, when it is quite pure, and is now known to be one of the most universal materials of nature: and as vegetable bodies contain so much of it in their own composition, they may be supposed to absorb it entire where they grow vigorously, especially as it is a simple material: but they may possibly form it also from water and air within their own vessels, when they are excluded from access to it externally. The whole atmosphere contains always a quantity of it in the form of carbonic acid, or fixed air; as is known by the scum which presently becomes visible on lime water when exposed to the air, and which consists of a reunion of the lime with the carbonic acid, which may therefore be said to encompass the earth. The simplicity of carbon as an elementary substance was disputed by Dr. Austin, who believed he had decomposed it. But Mr. Henry, by accurately repeating his experiments, has shown the fallacy or inconclusiveness of them, as may be seen in the Philosophical Transactions for 1797. And it is added that a further great reservoir of carbon exists in lime-stone, in the form of carbonic acid; which when the stronger acid is poured on, the calcareous earth becomes a gas, acquiring its necessary addition of heat from that which is given out in the combination of the stronger acid with the lime. It also acquires its necessary heat when lime-stone is burnt, from the consuming fuel, rising in the form of gas, and is dissipated in the air; and probably soon settles on the earth as it cools, as it is considerably heavier than the common atmosphere. But the great source of carbon exists in the black earth which has been lately left by the decomposition of vegetable and animal bodies; and is then in a state fit to combine with azote or nitrogen, and with oxygen, when exposed to those two gasses, as they exist in the atmosphere, and is thus adapted either to promote the generation of nitrous acid, or to form carbonic acid, and thus to assist vegetation. Morasses consist principally of the carbonic recrements of vegetable matters, which are gradually decomposed in great length of time into clay, with argillaceous sand, such as is found over coal beds, and some calcareous earth, as in marl, and lastly, with some iron and fossil coal. These by elutriation are separated from each other, and form the strata of coal countries. In other places they remain intermixed, as they were probably produced from the decomposition of vegetables and terrestrial animals; and form what in books of practical agriculture is called a *loamy* soil, consisting of carbonic matter, sand, and clay, with a portion of iron. It has always been observed, that this black garden mould, or earth produced from the recrements of vegetables, is capable of absorbing a much greater quantity of putrid effluvia than

either air or water, and probably of combining with its ammonia, and producing a kind of *hepar carbonis*, and thus facilitating vegetation. The practice of burying dead bodies so few feet below the surface is a proof of this; as the putrid exhalations from the carcase are retained, and do not penetrate to the surface. On the same account, the air over new ploughed fields has long been esteemed salutary to invalids, or convalescents, as it probably purifies the super-natant atmosphere. But it was not till lately known that carbon, or charcoal, absorbs with such avidity all putrid exhalations; if it has been recently burnt, and has not been already saturated with them: inasmuch that putrid flesh is said to be much sweetened by being covered a few inches with the powder of charcoal, or even for being buried for a time in black garden mould; as putrid exhalations consist chiefly of ammonia, hydrogen, and carbonic acid, and are the immediate products of the dissolution of animal or vegetable bodies; they are believed to contribute much to vegetation, as whatever materials have constituted an organic body may again, after a certain degree of dissolution, form a part of another organic body. The hydrogen and azote produce ammonia, which combining with carbon, may form an *hepar carbonis*, and by thus rendering carbon soluble in water, may much contribute to the growth of vegetables. It has been said, that some morasses have prevented the animal bodies which have been buried in them from putrefaction; which may in part have been owing to the great attraction of the carbon of the morass to putrid effluvia, and in part, perhaps, to the vitriolic acid which some morasses are said to contain in their constitution."

"Then here occurs," says the author, "an important question. By what other means is the solid carbon rendered fluid, so as to be capable of entering the fine mouths of vegetable absorbents? The carbon, which exists in the atmosphere, and in lime-stone, is united with oxygen, and thence becomes soluble or diffusible in water; and may thus be absorbed by the living action of vegetable vessels; or may be again combined by chemical attraction with the lime, which has been deprived of it by calcination. When mild calcareous earth, as lime-stone, chalk, and marble, has been deprived of its water, and of its carbonic acid by calcination, it becomes lime. Afterwards, when it is cold, if water be sprinkled over it, a considerable degree of heat is instantly perceived, which is pressed out by the combination of a part of the water with the lime; as all bodies when they change from a fluid state to a solid one, give out the heat which before kept them fluid. At the same time, another part of the water which was added, is raised into steam by the great heat given out, as above mentioned, and the expansion of this steam breaks this lime into fine powder, which otherwise retains the form of the lumps of lime-stone before calcination. But if too great a quantity of cold water be suddenly added, no steam is raised, and the lump of lime-stone retains its form, whence it happens, that some kinds of lime fall into finer powder, and are said to make better mortar, if slaked with boiling water, than with cold. On this account, the lime which is designed to be spread on land should previously be either laid in a heap, and either suffered to become moist by the water of the atmosphere, or slaked by a proper quantity of water: otherwise, if it be spread on wet ground, or when so spread is exposed to much rain, the heat generated will be dissipated without breaking the lumps of lime into powder, which will then gradually harden again into lime-stone, disappoint the expectations of the agricultor, and afflict him with the loss of much labour and expence. When the powder of slaked lime, mixed with sand and water, is spread on a wall, that part of the water which is not necessary

necessary for its imperfect crystallization, evaporates into the air, and the lime then gradually attracts the carbonic acid, which is diffused in the atmosphere: but as he supposes this carbonic acid is dissolved in the water, which is also diffused in the atmosphere, the lime is perpetually moistened by this new acquisition of water from the air, as that which before adhered to it, and had parted with its carbonic acid, evaporates. On which account, new built walls are months, and even years in drying, as they continue to attract water along with the carbonic acid from the air, which stands upon them in drops till the lime regains its original quantity of carbonic acid, and again hardens into stone, or forms a spar by its more perfect, or less disturbed manner of crystallization. It is consequently supposed, that the earth acquires carbon, both in a manner similar to the above, by its attracting either the carbonic acid, or the water in which it is diffused, from the atmosphere, and also by the specific gravity of carbonic acid gas being ten times greater than that of common air: whence, there must be constantly a great sediment of it on the surface of the earth, which in its state of solution in oxygen and water may be readily drank up by the roots of vegetables. Another means by which vegetables acquire carbon in great quantity, may be from lime-stone dissolved in water, which though a slow process, occurs in innumerable springs of water, which pass through the calcareous or marly strata of the earth; as those of Matlock or Bristol in passing through lime-stone, and those about Derby in passing through marl; and is brought to the roots of vegetables by the showers which fall on soils where marl, chalk, lime-stone, marble, alabaster, and fluor, exist, which include almost the whole of this island.

By this solution of mild calcareous earth in water, not only the carbon in the form of carbonic acid, not yet made into gas, but the lime also with which it is united, becomes absorbed into the vegetable system, and thus contributes to the nutriment of plants, both as so much calcareous earth, and as so much carbon.

And another mode may be by the union of this simple substance, with which all garden mould abounds, with pure calcareous earth into a kind of hepar, analogous to the hepar of sulphur made with lime, which abounds in some mineral waters, and this is supposed to be the great use of lime in agriculture."

For the purpose of ascertaining the probability of this mode of solution of carbon, the following experiment was made. "About two ounces of lime in powder was mixed with about as much charcoal in powder, put into a crucible, and covered with about an inch or two of siliceous sand. The crucible was kept red hot for an hour, or longer, and then suffered to cool. On the next day water was poured on the lime and charcoal, which then stood a day or two in an open cup, and acquired a calcareous scum on its surface. And though it had not much taste, except that of the causticity of the lime, yet on dropping one drop of marine acid into a tea spoonful of the clear solution, a strong smell like that of *hepar sulphuris* was procured, or like that of Harrowgate water, which evinced that the carbon was thus rendered soluble in water. Hence, the doctor suggests, that the sulphureous smell of Harrowgate and Kiddleston waters, and other similar springs, may be owing to the union of the alkali of decomposing marine salt, with the carbon of the earth they run through, and that this kind of water might thus possibly be used as a profitable manure in agriculture."

And a still further method by which vegetable roots acquire it, is suspected to be "by their disuniting carbonic acid from lime-stone in its fluid, not its gaseous state, which the lime-stone again attracts from the atmosphere, and consoli-

dates, and forms other matters included in the soil. First, because lime is believed by some agricultors, who much employ it, to do more service in the second year than the first, that is, in its mild state, when it abounds with carbonic acid, than in its caustic state, when it is deprived of it. Secondly, that the use of burning lime seems hence to be simply to reduce it to an impalpable powder, almost approaching to fluidity, which must facilitate the application of the innumerable extremities of vegetable fibres to this incalculable increase of its surface; which may thence acquire by their absorbent power, the carbonic acid from these minute particles of lime, as fast as they can recover it by chemical attraction from the air or water, or other inanimate substances in their vicinity. Thirdly, the hyperoxygenation of the perspirable matter of the plants, which thence gives up oxygen gas in the sunshine, would induce us to believe that a great part of the carbon which furnishes the principal part of vegetable nutriment, was received by their roots in the form of carbonic acid; and that it becomes in part decomposed in their circulation, giving up its oxygen; which thus abounds in the secreted fluids of vegetables from this source, as well as from decomposed water, as is generally known. And lastly, there is another way by which carbon is received into the vegetable system, which is by its existence in sugar and in mucilage, both of which are taken up undecomposed, as appears by their presence in the vernal sap-juice, which is obtained from the maple and the birch, which like the chyle of animals, is absorbed in its undecomposed state by the roots of plants." This matter must of course be considered as one of the principal constituent parts of vegetables; and would seem to enter into, and accumulate in the constitutions of plants in proportion to their successive growth. Some plants, however, take more into their composition than others, as from the result of chemical analysis, a quantity almost equal to all their other component parts has been found in particular instances, as in *agaricus piperatus*, *clavaria aurea*, *agaricus*, *lycoperdon tessellatum*; while in others, only a very small portion."

CARBON, in *Geography*, a cape on the N. coast of Africa, in the Mediterranean, directly N. from Bougie.

CARBONACEOUS Matter, in *Agriculture*, that kind of earthy matter, that partakes of the nature of carbon, or in which it abounds. It is found that materials of this sort are highly useful in promoting the growth of plants and of course may be used with advantage in the growth of different crops.

CARBONADE, or CARBONADO, in *Cookery*, flesh, fowl, or the like, seasoned and broiled on the coals.

CARBONARA, in *Geography*, a town of Naples, in the country of Bari; 2 miles S.S.E. of Bari.

CARBONARIA, in *Ancient Geography*, one of the mouths of the Eridanus in Italy, mentioned by Pliny: now Il Porto-di-Goro.

CARBONARIAN Forest, was that part of the great forest of Ardennes, which lay between the Escaut or Scheld, and the Meuse.

CARBONARIUS, in *Ichthyology*, a species of gadus, the coal-fish of the British zoology. See GADUS.

CARBONARO, Cape, a cape on the South coast of the island of Sardinia. N. lat. 39° 22'. E. long. 9° 47'.

CARBONAT of Ammonia, *Sal Volatile*, or *Salt of Hartshorn*, in *Chemistry*. This well known salt is always prepared for use by decomposing muriat of ammonia by carbonate of lime, and is done in the following manner. Mix together two parts of dry chalk with one of muriat of ammonia in powder, put them into a proper subliming vessel; and apply

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a gradual heat. A double decomposition takes place; the carbonic acid of the chalk uniting with the ammonia, and rising to the top of the vessel, and the lime remaining behind in union with muriatic acid. By degrees the carbonat of ammonia, which rises as a dense white vapour, concretes on the top of the vessel in a hard semi-transparent cake. The muriat of lime that remains, was formerly applied to little use, but since the discovery of its wonderful powers, as a freezing mixture when combined with snow, it may perhaps be made more valuable. The whole of the carbonat of ammonia is not obtained till after the vessel has been kept for some time at a low red heat.

The above is the actual way of preparing this salt, but the combination of the two ingredients may be made for experiments which gives a very beautiful appearance. Fill a jar about half full of carbonic acid gas standing over mercury, then throw up ammoniacal gas (obtained in the way mentioned under AMMONIA), and at the moment of contact, a very dense white cloud of carbonat of ammonia will fill the jar, a sudden and abundant absorption will take place, and if the gases be pure and properly proportioned, the mercury will rapidly rise, and fill the whole cavity, leaving only a pellicle of white saline matter attached to the side of the glass which is the solid ammoniacal carbonat. Some heat is also given out during this condensation of the gases enough to be sensible to the hand placed on the outside of the jar. To make the mixture of the gases sudden, the ammoniac should be added to the carbonic acid gas; for the former, being by much the lightest, then traverses the whole of the latter, and rises with it; but if this order is inverted and the carbonic acid added last, a white cloud is seen hovering over, and defining the point of contact of the two, and the absorption is more gradual. The same condensation may be shewn over water, (though not with the accuracy of measuring the respective quantities of the gases) simply by inclosing any vessel full of a mixture of lime and muriat of ammonia in an atmosphere of carbonic acid gas, the ammoniacal gas given off by this mixture seizing on the carbonic acid the instant it touches it.

The common solid carbonat of ammonia, when fresh made, or kept in a very close-stopped bottle, is a hard, tough, striated, white-semitransparent mass of no determinate form. Its smell is extremely pungent, and, to most persons, agreeable, but when strongly snuffed up it is apt to excoriate the nostrils. Its taste is salt, cool, and stimulating. It is very soluble in water, producing cold during the solution. At 55° water dissolves half its weight, and at 120° degrees its own weight; but at this heat the alkali begins to volatilize pretty freely, so that the saline contents of the hot solution are always varying. The salt, whether wet or dry, is remarkable for its volatility, the more in proportion to the heat, but even at a low temperature it is always losing weight whilst it retains its scent.

The crystallization of carbonat of ammonia is very difficult on account of its volatile nature, so that the common way of making a hot saturated solution and crystallizing by cooling will seldom answer. Bergman obtained tolerably regular crystals by taking a saturate solution at a moderate temperature, saturating this with carbonic acid, and then exposing it to severe cold, the crystals appeared to be octohedrons with truncated angles.

Carbonat of ammonia, on account of its rapid solubility, and the quantity of carbonic acid it contains, effervesces more violently with acids than most of the other carbonats.

A remarkable change takes place in this salt if exposed to the air. Let any quantity of the hardest and the most

pungent carbonat of ammonia be bruised to powder, spread on a plate, and exposed to the air, and in a very short time the surface becomes crumbly, and of an opaque white, and the whole atmosphere around will be strongly scented with a pungent ammoniacal vapour arising from the rapid volatilization of the salt. This loss of weight is so great, that in the course of ten or twelve hours no more than from forty to sixty per cent of the original weight will remain, and the salt is then changed to a soft pulverulent meal-like substance almost without scent or pungency to the taste. This same change takes place sooner or later to the fresh salt, if kept in bottles carelessly stopped.

Hence it appears probable that the recent or pungent carbonat contains a quantity of ammonia in excess, to which it owes its pungency and volatility, and the scentless effloresced salt probably consists of carbonic acid and ammonia in mutual saturation, together with a quantity of water.

This salt is soluble in alcohol, and thus an ammoniacal spirit is made by distilling the two together, often with various aromatic additions. See AMMONIA.

CARBONAT of Potash.—*Common potash.*—*Pearl-ash.*—*Salt of Tartar.*—*Vegetable fixed Alkali.* The vegetable fixed alkali was so named by the chemists of the last and former ages because it was procured in large quantities from vegetable substances, and was in no case supposed to be of mineral origin. From certain late analyses, however, by Klaproth and other able chemists, it has been discovered to enter as an essential ingredient into the composition of leucite, lepidolite, and a few other minerals, which are suspected by none to be of vegetable origin. But though the existence of potash in a mineral state has been thus demonstrated, yet it is so small in quantity and so difficultly procurable, that all the vast supplies of this substance which civilized life requires have as yet been entirely obtained from the combustion of vegetables.

If the woody or annual stems of vegetables that have grown in soils unimpregnated with common salt, after being sufficiently dried, are set fire to, the watery, the resinous, the oily, the acid, and carbonaceous portions are volatilized and dissipated in a state of more or less complete decomposition, and there remains behind a reddish or whitish powder called *ashes*; consisting chiefly of the earthy and metallic ingredients of the vegetable, together with a variable proportion of subcarbonat of potash. By lixiviation the alkaline part is dissolved out, and this solution, when boiled down to dryness and melted, leaves behind a dark brown saline mass, consisting of the carbonated potash, coloured by a small portion of vegetable inflammable matter; and in this state it is known in the English market by the name of *potash*. Calcination at a moderate red heat completely burns off the colouring particles, and the salt becomes of a spongy texture, and has a beautiful bluish white tinge, and is then called *pearl-ash*. Such is in general the process by which the vegetable fixed alkali is separated from the substances with which it is combined by nature and prepared for use. We shall now proceed to describe more at large the different methods of extracting this salt.

The simplest and rudest preparation of potash is called *ash-balls* in England, and *weed-ash* in Ireland. It cannot be said properly speaking to be an article of commerce, although a considerable quantity is annually made by the peasantry of both countries, and disposed of among the neighbouring farmers and bleachers. The vegetable from which in England and Scotland this impure alkali is produced, is the common fern or brakes (*Pteris aquilina*, Linn.) Many rough and heathy districts are entirely covered by this plant, which, when it has attained its full growth, about the middle

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middle of July, is cut down, and after being half-dried in the open air is gathered into small heaps and kindled. The combustion proceeds slowly, being accompanied by a smothering smoke and little or no flame, till the whole is reduced to a reddish-grey ash: this being carefully collected is sprinkled with a little water, and then moulded by hand into balls three or four inches in diameter, which, when they have acquired a certain solidity by drying in the sun, are ready for sale. In Ireland, thistles, docks, and weeds of all kinds are mixed with the fern, and the ashes are disposed of in their loose pulverulent state without any further preparation. According to Dr. Home, fern-ashes contain about $\frac{1}{9}$ of their weight of salt, consisting principally of sulphat and subcarbonat of potash: 1000 parts of the plant cut in August and thoroughly dried afford 36.46 of ashes, from which are obtained by lixiviation 4.5 of salt. The common Irish weed-ashes have been analysed by Mr. Kirwan, and when deprived of their water by a red heat, appear to contain one part of salt for 3.5 of ash; of this the free alkaline portion, however, amounted only to $\frac{1}{2}$ of the whole.

The potash of commerce, or *black potash*, as it is also called, is universally procured from the combustion of wood; and therefore its preparation can only be undertaken with success in those uncultivated countries where are vast natural forests, and where, from the badness of the roads, and imperfection of water communication, the value of timber is no more than that of the labour required to fell it. The only districts of Europe in which any considerable quantity of potash is made, are the mountainous forests of Germany, and the extensive woodland tracts of Poland and Russia. The British market, however, is principally supplied from the United States of North America, a country in which, from its rapid increase of population, there is a constant demand for cleared land for the purposes of agriculture, and therefore, where timber is looked upon rather as an incumbrance than as contributing either to the beauty or value of the ground on which it stands.

The American method is to pile up the wood, as soon as it is sufficiently dry to burn, in large heaps, and reduce it as quickly as possible to ashes: these ashes are then put into a wooden cistern with a plug at the bottom of one of the sides, and a quantity of water sufficient to make a strong lixivium is added; after standing for an hour or two the plug is withdrawn, and the water holding the potash in solution, runs out, leaving the earthy part still impregnated with alkali in the cistern. This solution is then evaporated to dryness in iron pans and hastily fused into compact reddish brown masses of semi-caustic potash, in which state it is fit for the market.

In Germany, where the value of wood is greater, and where more intelligence and economy are practised in the preparation of potash, the general method of proceeding is the same as that just mentioned, but with such variations, as though seemingly of little consequence, materially augment the produce of alkali. Care is taken to select such kinds of wood as are the richest in potash, the combustion is slower, and of course the temperature lower, in consequence of which, but little is lost by volatilization; the lixiviations also of the ashes are judiciously repeated till the whole of the alkali is extracted.

The common Russian potash is the impurest of all, containing nearly one half its weight of earth; and is thus prepared. A large pit is dug, into which are thrown burning brands and the smaller extremities of the branches, and when the whole is well kindled, the pit is filled up with logs and other large pieces, which at length, though very

slowly, are reduced to ashes. The coarser part of the ashes is then separated, by sifting, from the finer; all the alkali that it contains is procured by lixiviation, and this liquor is mixed with the remainder of the ashes and wrought into a paste. A pile is then built of wood, the interstices of which are filled with this paste, which being set fire to, the whole is reduced to ashes. This process is repeated several times till the ashes begin to clot and become hard; the most compact pieces, being then selected, are packed up for sale without any further preparation: the rest are lixiviated and boiled down to dryness in the usual manner.

Potash is converted into a much purer alkaline salt, called *pearlash*, by calcination: for this purpose the potash broken into moderately small pieces is spread on the floor of a reverberatory furnace, and being then kept red hot, but not melted, for an hour or two, stirring it occasionally with an iron rake, all the carbonaceous and colouring particles are burnt out, and there remains behind a dry, porous, and considerably caustic salt, extremely deliquescent, and from its bluish white colour, called *pearlash*.

It has been thought of consequence, in an economical point of view to discover the proportion of potash afforded by different vegetables, and many analyses have been made for this purpose. They are, however, for the most part unsatisfactory, as they indicate only the proportion of soluble saline ingredients without distinguishing the carbonated potash from the sulphat and muriat of potash with which it is always mixed. The most remarkable and interesting results will be found in the following table; part of which were ascertained by a committee of the academy of sciences at Paris and the rest by the chemists whose names are subjoined: 100 parts of each different species being previously thoroughly dried were burned by an open fire to ashes, which after being weighed, were accurately lixiviated till all their saline contents were extracted.

100 Parts.	Ashes.	Salt.	Salt from 100 parts of ashes.	Authority.
Fumitory -	21.9	7.9	36	Wiegleb
Wormwood -	9.74	7.3	74.8	ditto
Common nettle	10.67	2.5	23.4	Pertuis
Sow thistle (Sonchus arvensis) }	10.5	1.96	18.6	ditto
Fern -	5.	0.62	12.5	ditto
Ditto -	3.64	0.42	11.6	Home
Stalks of maize	8.86	1.75	19.7	Acad. Sci.
— funflower	5.72	2.	34.9	ditto
Buckwheat			33.3	Vauquelin
Vine branches	3.4	0.55	16.2	Acad. Sci.
Heath -			11.5	Wildenheim
Foxglove (Digitalis purpurea) }	-	-	33.	Leipsc Econ. Soc.
Celandine (Chelidonium majus) }	-	-	25.	ditto
Nightshade (Atropa belladonna) }	-	-	27.	ditto
Boxwood -	2.9	0.22	7.8	Acad. Sci.
Sallow -	2.8	0.28	10.2	
Elm -	2.3	0.39	16.6	
Oak -	1.3	0.15	11.1	
Beech -	0.58	0.12	21.9	
Aspen -	1.22	0.07	6.1	Acad. Sci.
Fir -	0.34	0.04	13.2	

Upon a cursory inspection of this table it appears that the succulent herbaceous plants afford a prodigiously greater

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proportion both of ashes and salt than the shrubby and ligneous ones: it is, however, to be observed, that they were all reduced to a state of perfect dryness before being weighed, a circumstance which will in a considerable degree account for the apparently greater quantity of salt contained in the succulent vegetables; for while the different kinds of wood will not lose more than $\frac{1}{3}$ or even $\frac{1}{5}$ of their weight in drying, fumitory will probably lose $\frac{1}{6}$ or even more. It is not likely, therefore, that it can ever be worth while to be at the expence of cultivating fumitory and wormwood, as some speculators have proposed, for the sake of the alkali contained in their ashes.

The varieties of pot and pearlash, which are found in the markets, would no doubt on analysis afford very different results, especially with regard to the proportions of earthy matter, of water, and of carbonic acid; it is not therefore perhaps much to be regretted that we possess no very accurate analysis of any of them. The only one on which any reliance can be placed, is of Dantzic pearlash by Mr. Kirwan, in which are contained about

60.3 potash
22.4 carbonic acid
7.2 water
8.7 sulphated potash
0.7 muriated ditto
0.7 earth

100.0

But if the analysis of any particular sample is of little consequence, generally speaking, yet it is of considerable importance both to the manufacturer and chemist to be in possession of a compendious and accurate mode of ascertaining the contents of the various kinds of pot and pearlash, in order to make advantageous purchases of articles, in the intrinsic worth of which there is so much difference. Upon the whole perhaps the best mode of proceeding on such occasions is as follows.

1st. Prepare a diluted sulphuric acid, by mixing the concentrated acid, called oil of vitriol, with three times its bulk of distilled water. Then test it by taking 100 grains of the diluted acid, and adding muriat of barytes as long as any precipitate falls down. The sulphat of barytes thus prepared, when washed with cold water and dried at a low red heat, contains 33.3 per cent. of sulphuric acid; hence the real acid in any quantity of the diluted acid is readily ascertained.

2d. Pulverize 500 grains of the alkali under examination, and digest it in warm distilled or rain-water, adding fresh portions of this fluid as long as any thing is dissolved. Then put all the solutions together, and drop in the tested sulphuric acid from a vial containing a known weight of the same, till the slightest possible excess of acid is indicated by a paper tinged with litmus. After this, heat the liquor to expel all the carbonic acid, and if the liquor changes the colour of turmeric paper, add a few more drops of sulphuric acid, till it ceases to show an excess of alkali. Now weigh the vial of sulphuric acid, and thus ascertain how much has been expended in saturating the alkali, and for every 100 parts of real acid (as previously determined by muriat of barytes) thus employed, set down 121.2 of pure potash. The alkali being the part which gives value to the whole, this is all the examination which in ordinary cases is required; but if the analysis is to be carried further,

3d. Take 500 grains more of the alkali, dissolve it in boiling water, and pour the filtered solution into a flask;

then place the flask and a vial containing about three ounces of pure and moderately strong nitric acid into the same scale of an accurate balance, and equipoise them. Afterwards add the acid, drop by drop, to the alkali as long as any effervescence takes place, and the loss of weight indicates the amount of carbonic acid. The solution will now probably crystallize; a sufficient quantity of distilled water is therefore to be added in order to dissolve the crystals, and nitrat of barytes is to be dropped in as long as any precipitate takes place: 100 parts of the dried sulphat of barytes, thus procured, indicate 73.6 of sulphated potash. This being removed, add muriat of silver to the clear liquor till it ceases to be decomposed: 100 parts of muriated silver shew 41.34 of muriated potash. Thus the saline contents are all ascertained; viz. potash, carbonic acid, sulphat, and muriat of potash. The earthy part is shown by the insoluble residue.

Having now treated of the impure subcarbonats of potash, we shall conclude this article by an account of the purer subcarbonats, and the perfect carbonat of potash.

The most important of the purer subcarbonats is *salt of tartar*; which is prepared in the wine countries in large quantities, and is the kind generally used in medicine. The lees of wine and the tartar that is deposited on the sides of the casks, are put into small bags about a foot long, and subjected to a strong pressure, in order to squeeze out all the wine, which is disposed of to the brandy distillers; the contents of the bags being carefully taken out without breaking form masses like loaves, which are dried in the sun, and then piled up in a furnace with alternate strata of charcoal. The fire being kindled and the draft properly regulated, the acid and inflammable matter of the tartar are burnt off without fusing the alkaline part; when the process therefore is finished, these loaves remain of nearly the same size as before, but very porous and perfectly white. Being then broken into pieces they are dissolved in hot water, and the clear lixivium being evaporated to dryness and calcined to whiteness, is ready for sale; $2\frac{1}{2}$ parts of tartar yield one of salt of tartar.

A more expeditious but less economical way of procuring salt of tartar, is to mix equal parts of crude tartar and nitre, and project the mixture into a red-hot crucible. A rapid deflagration takes place; the nitric acid and the combustible parts of the tartar mutually decompose each other, and there remains behind the alkaline base of each united with some carbonic acid. This preparation is called *white flux*, *nitre fixed by tartar*, *extemporaneous potash*.

The perfectly saturated carbonat of potash has not been known to chemists longer than from the time of Bergman. It may be prepared in two ways; the first, which was discovered by Berthollet, is as follows. Take equal parts of salt of tartar and carbonat of ammonia, dissolve the whole in warm water, pour it into a retort, and proceed to slow distillation; the potash having a stronger affinity for carbonic acid than ammonia has, deprives this latter of its acid, and in consequence ammoniacal vapour is given out in great quantity: when this ceases, the contents of the retort are to be poured into a convenient vessel, where by refrigeration a copious deposition of crystallized carbonat of potash will take place.

The other method, and that which is generally practised, is to put a solution of salt of tartar into an apparatus for impregnating water with carbonic acid, and then to throw in this acid till the alkali is quite saturated and refuses to take up any more.

The form of the crystals of carbonat of potash is that of a tetrahedral rhomboid with dihedral summits. This salt requires

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requires for its solution about four parts by weight of cold water, but no more than $\frac{1}{2}$ of its weight of boiling water: a considerable degree of cold is produced during its solution. It is hardly at all soluble in cold alcohol, and requires above 200 parts of this fluid when boiling for its complete solution.

It has been analysed by both Bergman and Pelletier; each of these chemists agree in the proportion of alkali, but they differ materially in their estimation of the water and carbonic acid.

Bergman.	Pelletier.
48	48 potash
20	43 carbonic acid
32	9 water
<hr/>	<hr/>
100	100

The taste of this salt is cool and fresh, with hardly any of the alkaline flavour; on which account, and because it is fully saturated with carbonic acid, it is greatly preferable to salt of tartar in the composition of effervescing drafts, and for other medical purposes. It is neither efflorescent nor deliquescent in the air. It is decomposable with abstraction of the acid by barytes, lime, and strontian, and with abstraction of the alkali by all the mineral, and by most of the vegetable acids.

The uses of potash are innumerable. It is consumed in the greatest quantities by soap-boilers, bleachers, and glass-makers. In the laboratory it is in constant and indispensable service.

CARBONAT of Soda. Kelp. Barilla. Natron. This salt is found to exist both in the vegetable and mineral kingdoms of nature. When mineral, it is met with either dissolved in the water of certain hot springs, as those of Carlsbad in Bohemia; or of certain lakes, as the natron lakes of Egypt and Hungary; or it occurs in the state of a fossil salt, as in the fossil natron of Tripoli, called trona. In the vegetable kingdom carbonat of soda has been found to exist, ready formed, in the *Salsola soda*, and in all probability is contained in all those succulent saline plants that grow in places impregnated with muriat of soda. In order to supply the vast demands for this alkaline salt, it is procured from both the sources above mentioned, by processes which we shall now relate, beginning with the mineral soda.

There are two varieties of mineral soda, the striated and compact. The striated has been hitherto procured only from Africa. It is found between Tripoli and Fezzan, forming a very thin stratum just below the surface of the soil. It is of a striated crystalline texture, somewhat resembling fibrous gypsum. It is collected to the annual amount of some hundred tons, but scarcely ever finds its way to the European markets. It is distinguished from common carbonat of soda, by being fully saturated with carbonic acid, by containing only a small quantity of water of crystallization, and by not efflorescing on exposure to the air. Its component parts, according to Klaproth, are

37. soda
38. carbonic acid
22.5 water
2.5 sulphated soda
<hr/>
100.0

The compact mineral soda is procured in quantity only from Egypt and Hungary. The Egyptian natron lakes, six in number, are situated in a barren valley, about 30 miles westward of the Delta. During three months in the year

they are supplied with water from copious springs, but as they receive no water during the rest of the year, some of the smaller and shallowest ones are generally dried up during the summer. The soil consists of lime-stone mixed with gypsum, and for the most part covered over with sand. The salts contained in these lakes are muriat and carbonat of soda, of which the former is deposited for the most part on the deepest side, while the latter is formed among the rushes that grow in the shallower places. The natron appears to be produced by the slow mutual decomposition of the lime-stone and common salt, assisted by the rushes up the stems of which the natron rises by the force of efflorescence. When the rushes thus encrusted are broken by the wind, the soda on their surface assumes its proper quantity of water, and forms a confusedly crystallized stratum of the thickness of from one to twelve inches according as the weather and other circumstances are more or less favourable. The efflorescences on the shore of the lakes and the detached crystals that form at the water's edge are mixed with a much smaller quantity of salt than the larger masses; these latter however being more convenient to carry, and being procured with the least trouble, are constantly preferred, and as no subsequent purification is had recourse to, the natron of Egypt is by no means so valuable as it might easily be made. It is chiefly exported to Greece and other parts of Turkey, also to Venice, France, and Britain.

The chief natron lakes of Hungary are four in number, situated between Dobritzin and Groszwaradin. These, in the winter season, when full of water, are from one to two miles in circumference, but by the middle of April or the beginning of May they are generally dried up, except some pits that have been sunk by art below the general level. In a few days after the water has disappeared, the whole surface of the cavity becomes white with saline efflorescences of natron mixed with sulphat of soda; these being removed, a fresh incrustation is formed in three or four days, and continues to be renewed with equal rapidity during the whole dry season of the year. A very heavy shower is sufficient to fill the lakes, but in a day or two they are dry again, so that no very material interruption is experienced till the latter end of October: by this time the water in the pits is fully saturated with natron, a considerable proportion of which crystallizes during the first frosts of winter, and thus terminates the harvest for the year; for after this the rains set in, and the lakes continue full of water till the ensuing spring. The Hungarian as well as the Egyptian natron seems to be brought into commerce without undergoing any preparation, as it appears in pulverulent masses of a dirty grey colour. The Hungarian natron has been analysed by Lampadius, and the Egyptian by Klaproth, with the following results:

Egyptian.	Hungarian.
32.6	14.2 carbonat of soda.
20.8	9.2 sulphat of soda
15.	22.4 muriat of soda
31.6	45. water
	9.2 earth
<hr/>	<hr/>
100.0	100.0

By far the greater part, however, of the soda that is employed, is of vegetable origin, and, like pot-ash, is procured from the combustion of plants. While the vegetables that grow in common soil yield pot-ash, those which flourish in salt water, or on the sea-shore, or wherever the soil is strongly impregnated with salt, yield soda. Of vegetable soda there are two varieties, viz. *barilla* and *kelp*, the

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former being made from the plants of the genera *Salsola*, *Salicornia*, &c. that grow on the sea-shore; the latter being the produce of fuci, and other marine plants.

The best barilla (properly *bariglia*) is made from the *salsola soda*, which is an object of sedulous and extensive cultivation to the Spaniards on the shore of the Mediterranean, especially in the vicinity of Alicant. It is sown in light low soils, that are embanked on the side next the sea, and furnished with flood-gates, by which the salt water may be occasionally admitted. In autumn, when the seeds are ripe, the crop is cut down and dried; the seeds are rubbed out, and the rest of the plant is burnt in very simple furnaces, the temperature of which is just high enough to cause the ashes to enter into a state of semi-fusion, and concrete into compact cellular masses. The most esteemed variety of this salt is called *sweet barilla*; it is of a greyish-blue colour, and is covered over with a saline efflorescence, when exposed for a time to the air; it is exceedingly hard, and when applied to the tongue discovers a sharp, pungent, alkaline flavour.

Kelp is made of what is vulgarly called sea-weed, or seawrack (whence the French term *foude de vareck*), that is, of such of the leafy fuci, principally the *Serratus* and *Vesiculifus*, as grow on rocks in the sea, between the high and low water mark. The most favourable situation for these plants is a sheltered bay, full of calcareous rocks. The season for gathering the plants is from May to August. On the British coasts they are cut with a scythe, as close to the rock as possible, and then bound up into large bundles, which being fastened to one end of a long rope, the other extremity of it is tied to a boat, and thus the labour of two or three men is capable of towing several tons weight to the shore. These bundles, when landed, are to be opened, and their contents spread thinly on the shore to dry, turning them from time to time, lest they should ferment, by which both the quantity and quality of the kelp would be greatly deteriorated. The ware, when dry, should be stacked secure from rain for a few weeks, till it becomes covered with a white saline efflorescence, and then it is ready to be burnt. The furnace employed for this purpose used to be, and in many parts still is, nothing but a round pit, three or four feet deep, and seven or eight feet across, lined with stones; the more skilful kelp-burners, however, make use of a kiln of the following construction.

It is built of stone, in the shape of a long open coffer, being 28 inches wide in the clear, about $2\frac{1}{2}$ feet high, and from 8 to 18 feet long. The bottom of the kiln being covered with brushwood or heath, a thin stratum of the dried ware is shaken lightly upon it, and fire is applied to the leeward side of the kiln. It must now be supplied with fresh ware, thrown lightly on, whenever the combustion reaches the surface: if the weather is perfectly calm, no other precautions are required, than to take care that the fire is not stifled, but if it blows ever so little, the windward side of the kiln must be covered with fods, and even both sides, if the weather is at all boisterous. When all the ware has been thrown on that is intended to be used at one time, care must be taken to cover every spot where the fire reaches the surface, with a little of the charred or least burnt part. After a time, that part of the mass which is nearest to the sides is seen to soften or melt, and now begins the most critical period of the whole process. An iron bar, previously heated, is to be introduced among the soft matter, which by this means is to be slowly stirred up and incorporated, adding by degrees some of the less burnt portions, and in this manner the whole is to be kneaded together till it becomes a pasty semi-fluid mass. It is a matter of considerable dexterity so to perform this pro-

cess as to be able to mix the dust and fragments of a preceding burning, without too much cooling the whole. If when this incorporation of the materials is begun the mass is too hard and dry, by waiting a short time, it will be found to have acquired the necessary temper, but if it is dry and pulverulent like ashes, it is expedient to have recourse to a little common salt, which, acting as a flux, will begin the fusion; or if the heat is very languid, a little pulverized brimstone may be made use of. When the kelp has been thus prepared, and is grown cold, it is broken into large lumps and is fit for sale. Well made kelp is of a bluish-grey colour, sometimes approaching to green; it has more or less of a cellular texture, and contains pieces of charcoal enveloped in the mass; when breathed on, it emits a faint sulphurous odour; to the taste it is caustic and alkaline, mixed with the flavour of common salt. It yields easily to the knife, but possesses a considerable degree of toughness. If dry, it is usually covered with a white saline efflorescence. The proportion of pure soda which it contains varies, according to Kirwan and Jameson, from 1.25 to 5. per cent.

Pure carbonated soda, from whatever substance, and by whatever means it is procured, is essentially the same. Its usual state is that of clear colourless crystals, in the form of rhomboidal octohedrons, or oblique tetrahedral prisms. To the taste it is sweetish, cooling, and sub-alkaline. It is soluble in $2\frac{1}{2}$ times its weight of water at 50° , and at a boiling heat dissolves in its own water of crystallization. By exposure to the air, it effloresces, and is converted to a white mealy powder, with the loss of the greatest part of its water, and this powder, when kept for some time at a low red heat, concretes into lumps, loses a small portion of its carbonic acid, and all its water, and is then called *dehydrated soda*. The component parts of crystallized carbonate of soda have been variously estimated, though the difference has not been very great. We shall mention the proportions as given by Bergman, and those adhered to by Mr. Kirwan.

Berg.	Kirw.
22.	21.58 soda
16.	14.42 carbonic acid
62.	64. water
100.	100.00

Soda, however, is capable of combining with a larger proportion of carbonic acid by dissolving the crystallized carbonate in water, and then throwing in carbonic acid gas. The crystals that are now deposited will be found to contain a considerably less quantity of water, and their sweetish sub-alkaline flavour will be changed for a cooling saline one; so that in this state it resembles the trona. It has not, however, been analysed with such accuracy as to enable us to state the proportions of its ingredients.

Carbonated soda is decomposed with abstraction of its base by almost all the other acids, and with abstraction of its acid by barytes, lime, strontian, and potash.

The purposes to which carbonated soda is applied are in general the same as those for which carbonate of potash is used; the circumstances that induce the occasional preference of one to the other will be mentioned in their proper places.

CARBONAT of Barytes. This compound is both found native, and may be procured artificially. For the mineralogical description of the native barytes, see *WITHERITE*; and for the way of procuring the artificial carbonate, see *BARYTES*.

The artificial carbonate appears, from the analyses of Klaproth and Pelletier, to be composed (when dried and ignited

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ignited for a few minutes at a low red heat) of 22 parts of carbonic acid and 78 of barytes.

The artificial is much more soluble than the natural carbonat in all the acids. The muriatic or nitric acids, moderately diluted, dissolve it with great ease and with much effervescence. This carbonat is scarcely soluble in water, but when in fine powder diffused through water, and a stream of carbonic acid is sent through it, water then dissolves (according to Fourcroy) about $\frac{1}{8}$ of its weight; but the carbonat is not crystallizable from the solution, the excess of carbonic acid flying off by exposure to air or heat, and the carbonat then returning to its pulverulent state.

CARBONAT of Strontian. This carbonat is found native (see STRONTIANITE), and may also be readily made by artificial means (see STRONTIAN).

Carbonat of strontian, gently dried and ignited, is composed, according to Klaproth, of about 30 of carbonic acid, and 70 of strontian. Nearly the same observations belong to this carbonat as to the carbonat of barytes, but the affinity of the carbonic acid is not so strong, and it dissolves in acids somewhat more readily.

CARBONAT of Lime. Under the article LIMESTONE will be described most of the natural varieties of this very important class of minerals; and under LIME the method of freeing them from their carbonic acid, and of analysis in general.

The purest carbonat of lime is prepared by adding carbonated ammonia to a pure nitric or muriatic, or any other solution of lime. The precipitation is much assisted by a boiling heat, for this alkali contains so much carbonic acid that a part of the lime would be re-dissolved in this acid unless the excess be driven off by heat. The white precipitate washed thoroughly, and heated in a low red heat for about ten minutes, is then very pure carbonat of lime, containing scarcely any water, and no remaining alkali, and consists simply of about 45 parts of carbonic acid to 55 of lime.

The carbonats of potash or soda will also have the same effect as the carbonat of ammonia, but it is much more difficult to separate entirely every atom of the alkali from the precipitate when the fixed alkalies are used than with the volatile, as in the latter case the last adhering portion is dissipated by the heat. In consequence, the carbonat of lime prepared by the ammoniacal carbonat has a dry, loose, incoherent feel, like powdered starch, which the other has not.

Carbonat of lime is not in any sensible degree soluble in pure water, but with an excess of carbonic acid it dissolves without difficulty, and hence the lime of lime-water will be precipitated as a carbonat by a small quantity of water holding carbonic acid, and will be re-dissolved by a larger portion of the same, as explained under the article CARBONIC acid.

The solutions of carbonat of lime in water, with excess of carbonic acid, change the red colour of Brasil wood to blue, as observed by Bergman. But they also change litmus-blue to red, on account of the excess of carbonic acid.

From the experiments of many accurate analysts, compared by Kirwan, it appears, that carbonated lime with its own weight of carbonic acid is rendered thereby soluble in water, however small the quantity of fluid, but in proportion to the quantity of water less carbonic acid will suffice.

CARBONAT of Magnesia. This carbonat is not found native, except largely mixed with some kinds of limestone, or in solution in some mineral waters.

The artificial carbonat (the common *magnesia alba* of the shops) is prepared by decomposing sulphat of magnesia, or Epsom salt, by carbonat of potash. The following is the common process. Dissolve a pound of sulphat of magnesia

in five pints of water, add to this a pound of good carbonat of potash, dissolved in a like quantity of water, and boil them for a few minutes. A copious white precipitate is produced immediately, which renders the whole mixture very thick. Strain it, while hot, through linen, and wash the white mass left on the strainer repeatedly with boiling water poured on it, till the clear filtered water drops through quite tasteless. Then dry the precipitate over a fire, and a white tasteless powder is left, which is the common magnesia. The drying of this precipitate is extremely tedious, for being of a very light spongy nature, it holds a large quantity of water without dripping, and consequently the filter soon becomes useless. In the large way the wet mass is first laid on large slabs of chalk, which suck up much of the moisture very expeditiously.

Common carbonat of magnesia, in its pulverulent state, is excessively light, and lies so loose that a smaller weight of it will fill a bottle of a given size than almost any other known powder. It consists of water, carbonic acid, and magnesia, in proportions somewhat varying. The quantities of each have been thus estimated: by calcination in a full red heat for about half an hour, both the water and the carbonic acid are expelled, and the loss amounts on an average to about 55 per cent. On the other hand, 100 parts of the same carbonat lose by solution in acids only 34 parts, which are carbonic acid, and hence the constituents of 100 parts of the carbonat will be 34 of carbonic acid, 21 of water, and 45 of magnesia. The calcination of this carbonat is easy, compared to that of lime, and in the process it shrinks to a very small bulk, and becomes somewhat harsh to the feel. When quite freed from water and carbonic acid, the pure magnesia that remains is the *MAGNESIA usta* of the shops, which see.

The quantity of alkali directed for the decomposition of the sulphat of magnesia is somewhat more than necessary for the purpose, so that the clear liquor that first comes off through the filter is a solution of sulphat of potash with carbonat of potash.

Another form or species of carbonat of magnesia is that in which the earth is fully saturated with carbonic acid, forming a crystallizable salt. It is very soluble in water, whereas the common pulverulent carbonat of magnesia is absolutely insoluble in pure water.

The crystallized species is formed in two ways. It is produced by mixing the same materials as the common carbonat, but *without applying heat*. The excess of carbonic acid, which the heat drives off, remains in this case united with a portion of the magnesia, and if this mixture be left to spontaneous evaporation, a quantity of small long four-sided prismatic crystals may be picked out of the crystals of sulphat of potash, which are the crystallized carbonat of magnesia. But a neater and better way of preparing them is to pass a stream of carbonic acid through water rendered milky by the common magnesia, which will be seen gradually to become clear, owing to the solution of the earth in the carbonic acid and water, after which let the solution evaporate slowly in a warm room. The crystals will then form readily, or even if the solution is pretty strong, they will deposit by mere rest for a time.

This salt consists, according to Bergman, of about 25 of magnesia, 50 of carbonic acid, and 25 of water, when analysed as the former carbonat. It is soluble in 48 parts of cold water, but in much less when the water also has an excess of carbonic acid, and hence it is often found during the slow evaporation of many of the carbonated mineral waters.

Carbonated magnesia, in any state, is decomposed by potash, soda, barytes, lime, and strontian, and also by all the salts, with the basis of these three earths. Ammonia and magnesia

magnesia seem to have nearly equal affinities for carbonic acid, so that either of the two will only partially decompose the saturated carbonat of the other substance. Thus, if pure ammonia be added to the crystallized magnesian carbonat, the precipitate is not pure magnesia, but the *sub-carbonat*, or common magnesia; and on the other hand, the same sub-carbonat is produced, if pure magnesia be added to carbonat of ammonia. In either case also a part of the ammonia unites with the magnesia and carbonic acid, (as Fourcroy has observed) forming a triple salt, the *ammoniac-magnesian carbonat*.

CARBONAT of Alumine, Glycine, Zircon, &c. For the remaining earthy carbonats, see the respective earths.

CARBONATS (Metallic). See the respective metals.

CARBONAT of Lime, in Agriculture, a term applied to lime in a state of combination with carbonic acid. This sort of union is frequently met with in nature, and extends to all the stony substances which are distinguished under the title *calcareous*, such as lime-stone, chalk, marble, &c. In burning or converting these substances into lime, they are deprived of their carbonic acid or fixed air; but on cooling begin to absorb it again from the surrounding atmosphere. See **LIME**.

Lime, when in the state of a carbonat, is frequently termed *effete lime*, and may often be employed for the purposes of agriculture with much greater benefit than in its caustic state, or that of quick-lime.

CARBON-BLANC, in Geography, a town of France, in the department of Gironde, and chief place of a canton, in the district of Bourdeaux. The place contains 1800, and the canton 16,933 inhabitants: the territory comprehends $24\frac{1}{2}$ kilometres, and 20 communes.

CARBONE, a small river of Spain, which runs into the Guadalquivir, a little above Seville.

CARBONELLI, STEFFANO, in *Biography*, an Italian performer on the violin, brought into England by the duke of Rutland, about the year 1720. He had been a scholar of Corelli, and was said to play much in his manner. His hand was not brilliant, but he had a good tone, and knew music well; as a book of 12 solos, which he dedicated to his patron, the duke of Rutland, testified; the six first had a double-stopped fugue in each, and the rest had pleasing melodies in correct and judicious counterpoint; nor were they destitute of invention, as far as his ideas and hand could carry him. We have seen the book, which would be now difficult to find. It is a folio, engraved on copper.

In 1722, he had a benefit concert at Drury-lane theatre, of which the bill of fare is minutely given in the *Daily Courant*; (see *Hist. Mus.* iv. 648.) by which we may judge of the musical dainties of the season.

Carbonelli was a steady and judicious leader, and, on his arrival in England, was placed at the head of the Opera orchestra, where he continued to lead, till 1725, when he resigned, and was engaged by Mr. Fleetwood at Drury-lane, and there played concertos in the second musics, and frequently solos between the acts. But he resigned this station when Handel began to perform oratorios, in which he continued to lead as long as their great author survived. Late in life, relinquishing music as a profession, he entered into the wine trade, and established a house, which still subsists. He was a man of worth and probity, and honoured with general esteem for his private virtues as well as his professional talents. While he led the band at Drury-lane, sir Richard Steel, in his comedy of *The Conscious Lovers*, introduced him to play a solo for the amusement of Indiana, taking occasion in the dialogue, after his departure, to make

Bevil jun. pay him and men of talents many compliments. He died in 1772.

CARBONI, in *Geography*, a town of Naples, in the province of Basilicata; 16 miles S.W. of Turin.

CARBONIC ACID, CARBONIC ACID GAS, or Fixed Acid.—Aerial acid.—Mephitic acid.—Kohlensaure, Germ.—Acide carbonique, Fr. in *Chemistry*.

Carbonic acid, in its uncombined state, is only known to us as a gas, and it is the first gas in which acid properties were clearly discovered. It is known to be so by reddening certain vegetable blues, by neutralizing alkalies and alkaline earths, and by being formed by the union of a combustible base.

The sources of this acid are immense, and widely diffused. The chief are the following.

1. The atmosphere always contains a small portion, which varies in the immediate vicinity of places where the processes of respiration and combustion are going on, though somewhat less than might be expected. The general average is estimated at about one hundredth part. It is readily extracted from a confined portion of the atmosphere by the contact of lime or the caustic alkalies.

2. Almost every natural spring, as it rises from the earth, contains a portion of this air; and some waters hold so large a portion as to give them, when exposed to the air, a very brisk, frothy appearance, and a very sensible taste and decidedly acid properties. The celebrated springs of Spa, Pyrmont, and Seltzer, are of this kind, and the most highly carbonated water of them contains about its own bulk of the gas.

3. Every process in which coal, wood, or any other carbonaceous substance is burnt, is one which generates this acid gas. The same may be said of the process of respiration.

4. The vegetation of plants under some circumstances generates carbonic acid.

5. The spontaneous decomposition of vegetable and animal matter produces this gas in abundance; hence fermentation and putrefaction are carbonating processes.

6. But the largest store of carbonic acid that exists is that enormous quantity which is solidified in all the immense beds of lime-stone, chalk, and calcareous stones with which every part of the globe abounds. Many of these contain 40 per cent. or even more of their *weight* of this acid.

Carbonic acid gas, or fixed air, has the following properties. It is permanently gaseous at any temperature or pressure. It is fatal to animal life, any living creature immersed in it perishing as soon as it would by total interruption of respiration. Hence the small, warm-blooded animals die in it almost immediately; dogs, and animals of bulk, speedily become senseless in it, but recover, if removed in a short time; frogs, and cold-blooded animals, live in it for a considerable time, owing to their power of subsisting for a time without external respiration; but when this is past they perish as the warm-blooded animals. This air is equally incapable of maintaining combustion, so that a candle let down into a jar of it is extinguished as soon as it enters the gas as effectually as if dipped into water. Even the admixture of so small a proportion as one-ninth of carbonic acid gas renders common air unable to maintain combustion, according to Mr. Cavendish's experiments. It is the heaviest of all the known gasses, except the sulphureous. Hence, as soon as generated, it falls through the atmosphere to the lowest places, unless mingled with it by agitation or long standing. Thus, if a jar of fixed air is inverted from some little height over a burning taper, enough of it falls unmixed upon the taper to extinguish it. The weight of this gas is, in

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in all circumstances of pressure and temperature, to that of common air very nearly as three to two; hence its specific gravity will be about .001806, and the weight of a cubic inch at 60° therm. and 29.5 inch bar. will be about .456 of a grain.

This gas also combines readily with water and many other substances, as will be presently mentioned. Its combinations with the alkalis, earths, and metals, are called *carbonats*.

Carbonic acid gas is procured, for experiment, generally from lime-stone, chalk, marble, or any carbonat of lime, either by heat or by the action of an acid, almost any of which will dislodge the carbonic from its bases, and cause it to assume a gaseous form. The mild alkalis may also be used for this purpose. The action of acids always produces an effervescence, or frothing at the surfaces of contact, owing to the rapidity with which the carbonic acid takes the form of a gas; and hence all stones that effervesce with acids may be presumed (with but few exceptions), to consist chiefly of carbonat of lime. To obtain carbonic acid gas in quantity and in a regular, uniform stream, put a number of small lumps of marble or calcareous spar in any proper vessel, pour on them sulphuric or rather muriatic acid diluted, and receive the gas as it is generated. If it is collected over water, some will be lost at first, owing to the absorption of a portion by the water itself. Or else, put some dry chalk or marble, or especially carbonat of magnesia, in an earthen retort and heat it to redness. The carbonic acid gas then comes off in abundance. When decomposed by acids, a grain of marble will yield nearly a cubic inch of gas.

As all mixtures under the vinous fermentation, give out an abundance of this gas, this affords a ready way for procuring it, and substances under experiment may be immersed in an atmosphere of the gas by being simply suspended over the fermenting vats of brewhouses.

Carbonic acid gas is readily absorbed by water; and thus the natural carbonated waters may be easily imitated. This fluid has a pungent, agreeable, brisk taste, and bubbles vigorously, when exposed to air, the more in proportion to the temperature. This absorption is shewn in a very easy manner, simply by filling a phial with water, then displacing about half its contents, by throwing up the gas, and then pressing the finger close against the mouth, shaking the half-full bottle violently. It will then absorb so much of the gas as to make nearly a vacuum within, which will be felt by a strong external pressure of the atmosphere on the finger that shuts the communication. This absorption is also equally promoted by subjecting the gas to strong pressure, when in contact with the water that is to absorb it; and it is by the united action of pressure and agitation that the manufacture of the carbonated medicinal waters (such as the artificial Seltzer, and the like), is carried to such great perfection.

Water, at about 50° temperature, will absorb, by mere agitation, nearly its own bulk of carbonic acid gas; but by the combined action of pressure and agitation, three times as much may be thrown in.

Mr. William Henry, in his valuable experiments on the absorption of gases by water, (Phil. Transf. for 1803,) has shewn that the quantity of gas absorbed is (*ceteris paribus*), regulated by the purity of the gas; for, even if the gas itself is obtained unmixed with any other, some addition of atmospheric air must take place from the vessels in which the experiment is made, and also from the water, which cannot be absolutely purged of common air by boiling or any other method. Hence Mr. Henry found, that if 20 measures of nearly pure carbonic acid gas were agitated with 10 measures of water, full 10 measures of the gas would be absorbed;

but if 20 of the gas, mixed with 10 of common air, were agitated with the same quantity of water, only six measures could be taken up. Water also parts with a great proportion of its carbonic acid by mere exposure to air, which is independent of the circumstance of removing the mechanical pressure of corks, &c.; for Dr. Brownrigg found that the gas would not escape from Seltzer water, when in a close bottle, though a loose empty bladder supplied the place of a cork, and in which, therefore, the gas had ample room to expand itself; but a free communication with the air was necessary for this escape. The absorption of the gas is inversely as the temperature of the water; cold water absorbing much more than warm. The diminution of absorption, on raising the heat, Mr. Henry estimates at about $\frac{1}{4}$ th of the whole for every ten degrees above 55°. With regard to the effect of pressure, it appears that water, in all cases, takes up as great a bulk of condensed as of expanded gas, under similar circumstances of temperature.

Therefore, as the bulk of all aeriform bodies is inversely as the pressure to which they are exposed, the quantity absorbed is directly as the pressure; that is, for example, if a pressure of 30 inches of mercury will cause a certain bulk of carbonic acid to be absorbed, a pressure of 60 inches will cause a double absorption.

The specific gravity of water, holding its own bulk of carbonic acid, is about 1.0015. This gas is readily and almost totally again expelled by heat; hence, in the analysis of mineral waters, the first step to be in general pursued is the expulsion of the gases which it may contain, by boiling for about ten or fifteen minutes.

Carbonated water shews its acid properties by changing the colour of litmus from blue to red. This it will do, according to Bergman, when the water contains as much as $\frac{1}{15}$ th of its bulk of the gas. It is very conveniently shewn, in the way mentioned by Kirwan, that is, by adding, in a thin glass tube, or jar, about equal quantities of the carbonated water, and of litmus infusion diluted, so that the blue is just distinguishable. The colour then becomes of a very dilute red, and is better remarked when compared with a similar glass tube full of the same dilute litmus liquor and plain water. To shew that it is the carbonic and no other acid that produces this change, let some of the carbonated water be boiled strongly for a few minutes, and then it will leave the blue unaltered.

But lime-water is a much more delicate test for carbonic acid, either gaseous or liquid. When a gas is to be tried, nothing more is required than to shake it with lime-water, or with barytic or strontian water, and the immediate mildness of the water will indicate the presence of carbonic acid gas in almost every case.

But with liquid carbonated water, it should be remembered, that though the first portion of carbonic acid will precipitate the lime from its solution in the form of white carbonat of lime or chalk, a greater portion of the acid will re-dissolve the *carbonat of lime*. So that if a highly carbonated water and lime-water be mixed together at repeated portions, the mixture will first become turbid by the separation of the carbonat of lime; then an additional quantity of carbonated water will make it again clear by re-dissolving the carbonat; after which another portion of lime-water will again make it turbid, and fresh carbonated water again clear, and so on, in proportion to the mutual saturation and supersaturation of the two ingredients. Therefore, as no error can arise from an excess of lime-water, the latter, to shew, in all cases, the presence of carbonic acid, should be in equal quantity with the carbonated water. According to Bergman's valuable researches on carbonic (called by him *aerial*) acid,

CARBONIC ACID.

acid, lime-water will detect by its cloudiness as little as one cubic inch of the gas in 7000 grains of water, that is, where the weight of the gas is only $\frac{1}{14000}$ th of the whole.

This gas is also readily and totally absorbed from any gaseous mixture by slight agitation with a solution of caustic or nearly caustic alkali. A much smaller quantity of alkaline solution will suffice than of lime-water, as the former may be made much more concentrated. This is often convenient; but it is not so palpable a test, as no cloudiness or change of appearance in the alkaline solution ensues.

Carbonic acid, according to the modern system of nomenclature, signifies an acid whose basis is carbon; and hence that it is produced by the combustion or oxygenation of carbon or pure charcoal. It required the united efforts of many of the most eminent chemists to elucidate the nature of this important acid, and to shew that the very same substance which existed as a large component part of all calcareous stones, and was given off abundantly by many of the natural mineral waters, was also the sole product of the combustion of charcoal, and all carbonaceous matters. The full discovery and proof of this fact are due to Lavoisier, who made the elementary experiment of burning a given weight of charcoal in oxygen gas of known purity, (no other substance being introduced than a very minute portion of phosphorus to begin the combustion,) and found the product of the combustion to be this acid gas, the weight of which, when removed by caustic alkali, corresponded very exactly with the loss of charcoal and oxygen. Very little actual diminution of bulk takes place at first in this combustion, since the product is itself a gas, and not a liquid, as happens after the combustion of sulphur, phosphorus, &c. and therefore it is not till caustic alkali or lime-water is introduced that the production of the carbonic acid, and consequent loss of oxygen, are made apparent. From this elementary experiment, Lavoisier infers, that carbonic acid is composed of about 28, by weight, of charcoal, and 72 of oxygen, and the results of subsequent inquiries nearly, if not absolutely, confirm the accuracy of this statement.

Carbonic acid is at its highest state of oxygenation, and is the only state in which it has acid properties. United with less oxygen it forms the *carbonous oxyd* as noticed in the last article, in which, also, the partial disoxygenation of carbonic acid and consequent production of the carbonous oxyd are described.

Carbonic acid has been *completely* disoxygenated (that is, reduced to black pulverulent charcoal) by only one substance, namely, by phosphorus. This discovery was made by Mr. Tennant, and was followed by other valuable experiments by Dr. Pearson. (Phil. Trans. for 1791-2.)

From the well known fact that phosphorus cannot be made by distilling phosphat of lime and charcoal, the latter not having the power of decomposing this acid when united with lime, Mr. T. inferred that the united actions of phosphorus and lime might be sufficient to decompose carbonic acid by a stronger affinity with its oxygen. He accordingly put some phosphorus into a coated glass tube closed at one end, and over the phosphorus some powdered marble. The open end of the tube was then also closed, except a very small aperture, to prevent the free access of the external air, and the tube was then heated red hot for a few minutes. When cold and broken it was found to contain a black powder consisting of true charcoal mixed with both phosphat and phosphuret of lime, together with some undecomposed marble. In this experiment the only source of the black carbonaceous powder can be the carbonic acid of the marble, which appears to have been decomposed by complicated affinities, namely by that of part of the phosphorus for the

oxygen of the carbonic acid, of the rest of the phosphorus for the lime forming the phosphuret of lime, and also by the phosphoric acid (as soon as formed) for another portion of the lime forming the phosphat of lime. Or, in other words, the carbonat of lime must undergo two disuniting processes before the charcoal can be produced, namely, the carbonic acid must be separated from the lime to which it has a certain affinity, and also the oxygen of the carbonic acid must be separated from the carbon which is its base. The lime is detached from its union with the carbonic acid by the united affinities of part of the phosphorus for lime, and also of the phosphoric acid, when formed, for the lime. On the other hand, the carbonic acid is decomposed by the direct affinity of phosphorus for oxygen, which is great, but however of itself less than that of carbon for oxygen, since, in the common distillation of phosphorus, it is produced by decomposing phosphoric acid with charcoal. Therefore the decomposition of carbonic acid here produced is the result of combined affinities, and could only be effected in this manner.

Dr. Pearson decomposed carbonic acid by a similar process, but with phosphorus and carbonat of soda instead of carbonat of lime. Sufficient quantity of the black powder was procured in both cases to prove that it was genuine charcoal, and yielded carbonic acid again on combustion with nitre.

Many liquids absorb carbonic acid with apparently as much ease as water, such as alcohol, oil, &c. but such mixtures seem to produce no remarkable chemical change.

The affinity of carbonic acid with the alkalis, earths, and metals, is so weak that it may be displaced by every other acid, the boracic excepted. This weakness of affinity is doubtless much owing to the tendency which it has to assume a gaseous form as soon as disengaged.

The order of the affinities of this acid in the liquid way for the alkalis and earths is barytes, strontian, lime, potash, soda, magnesia, and ammonia. With regard to the two latter indeed, the force of affinity is so nearly balanced that each substance will partially decompose the carbonat of the other according to the temperature. Thus at a higher heat the ammonia, from its increased tendency to volatilization, loses much of its force of affinity with solid or liquid bases, and then its carbonat is decomposed by magnesia, which no heat can volatilize; but in a low temperature the affinity of the ammonia prevails and it decomposes the magnesian carbonat, though very imperfectly.

As the carbonic acid quits every substance in a high heat its relative affinities in the dry way cannot be ascertained.

CARBONIC acid, in *Agriculture*, an acid that abounds in nature, and is mostly found in the form of an aeriform fluid, or gas. See **CARBONIC acid**.

The author of the "Philosophy of Gardening" remarks, "that when vegetable substances are decomposed by fermentation, there is a quick union of oxygen and carbon; and this carbonic acid gas, called formerly fixed air, rises up in vapour, and flies away. But where this process goes on more slowly, as in a dunghill lately turned over, or in black garden mould lately turned over and thus exposed to the air; much of which remains in the cells, or cavities of the hot-bed, or border, this carbonic acid is slowly produced, and is absorbed by vegetable roots, he supposes, in its fluid state, or dissolved in water before it acquires so much heat as to rise in the atmosphere in the form of gas." This carbonic gas, in its fluid state, or dissolved in water, not in its aerial or gaseous state, is, he conceives, the principal food of plants; because their solid fibres consist principally of carbon, and their fluids of water, as is evident from their analysis.

CARBONIC earth, or *soil*, that sort of earth, or soil, in which there is a considerable portion of decayed vegetable matter. Boggy and other wet kinds of lands, where any coarse vegetable productions have been suffered annually to become putrid, are mostly of this kind; and likewise such grounds as have been much enriched by manures, such as those of old gardens. The surface stratum of lands in general partakes of this nature. See **CARBON**.

CARBONNE, in *Geography*, a town of France, in the department of the Upper Garonne, and chief place of a canton, in the district of Muret; 7 leagues S. of Toulouse. The place contains 1825, and the canton 8676 inhabitants; the territory comprehends 202½ kilometres, and 13 communes.

CARBU, a town of Italy, in the state of Genoa, seven miles W.N.W. of Finale.

CARBULA, or **CARBULO**, in *Ancient Geography*, a town of Spain, in the department of Corduba, according to Pliny.

CARBUNCLE, in *Heraldry*, a charge, or bearing, consisting of eight radii, or spokes; four whereof make a common cross, and the other four a saltier. Some call these radii *baltons*, or *flaves*; because round, and enriched with buttons, or pearls, like pilgrims' staves; and frequently tipped, or terminated with fleurs-de-lys. Others blazon them, royal sceptres placed, in saltier, pale and fesse.

CARBUNCLE, in *Mineralogy*. See **SPINELL**.

CARBUNCLE, *Carbunculus*, also denotes a sort of sandy matter found in Hetruria, formed of a hard earth of the same name, concocted in the viscera of the mountains, by the heat of the subterranean vapours.

Pliny and Varro speak of the carbunculus, as a peculiar kind of hot, dry, lean soil.

CARBUNCLE, in *Surgery*, a roundish, hard, livid, and painful tumour, quickly tending to mortification, and (when it is malignant) connected with extreme debility of the constitution. See **ANTHRAX**. When this complaint is symptomatic of the plague, a pestilential bubo usually attends it. See **PLAGUE**. The carbuncle is seated deeply, in parts provided with cellular membrane; and therefore does not soon discover its whole dimensions, nor the ill digested matter it contains. As this tumour is commonly a symptom of depraved health, our chief attention should be directed to the re-establishment of the patient's strength, rather than to the local treatment of the carbuncle. See the directions given under the article **GANGRENE**, which will generally apply to the case in question.

Bleeding, purging, and other antiphlogistic means can very seldom be admissible in the treatment of carbuncles; but, on the contrary, we should support the patient's strength by powerful tonics, fermented liquors, country air, and anti-putrescent vegetables; while the tumour itself may be poulticed, and fomented with anodyne decoctions, till it be fit to be opened by the lancet.

CARBUNCULATION, the blasting, or scorching of the new-sprouted buds of trees, or plants, either by excessive heat, or excessive cold.

It happens chiefly in the spring and autumnal seasons, when vegetables being covered with dewy vapours, a sudden cold comes on them, which congealing those vapours, the nutritious juice of the plant is coagulated, and the texture of its fibres destroyed.

CARBUNCULUS, in *Ornithology*, escarboucle, and carbuncle humming-bird. See **TROCHILUS CARBUNCULUS**.

CARBURET, in *Chemistry*, is a combination of charcoal with any other substance. Thus, *carburetted hydrogen* is hydrogen holding carbon in solution. The only other carburets hitherto certainly known are, *carburetted sulphur*, *carburetted iron*, and *carburetted copper*.

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CARCA, in *Ancient Geography*, a town of Spain, placed by Ptolemy in the interior of the country, inhabited by the Bastitani.

CARCAJOU, in *Zoology*, the name of an animal of the badger kind, said to be first described by M. Sarassin in Hist. Acad. Soc. 1713: he speaks of it as a small quadruped, but very strong and furious. This is the *carcajou* of Buffon, *American badger* of Pennant, and *ursus Labradorius* of Linnaeus and Schreber, being found chiefly in the Labradore country, North America.

CARCAMOUSSE, in *Military Language*, a ram, a large wooden machine, having one end fortified and covered with iron, which the ancients made use of at sieges for battering walls. It is also the name of a large machine of wood, used at present for driving piles into the ground. Under Charles the Simple, this name of carcamousse was given to the ram.

CARCANO, **JOHN BAPTIST**, in *Biography*, born at Milan in 1538, was a favoured disciple, and inmate of Fallopius, and profited so well by his instructions, as to be thought worthy of being coadjutor to that great anatomist, when he was only three or four and twenty years of age. On the death of Fallopius in 1563, Carcano was invited to Pavia, where he lectured with great applause. In the course of his dissections, he discovered several errors in the description of the heart and other parts of the body in the works of the old anatomists, which neither Vesalius nor Fallopius had detected. His works are, "Libri duo Anatomici; in altero de cordis vasorum in fœtu unione pertractatur, in altero de musculis palpebrarum atque oculorum motibus deservientibus accuratè disseritur," Ticini, 1574, 8vo. In the first there are accurate descriptions of the foramen ovale, so called since from his account of it, and of the ductus arteriosus, which had been omitted, or erroneously described by Vesalius and Fallopius. In the second he describes the muscles of the eyes and eye-lids, and the puncta lacrymalia, correcting here also some errors into which his master and former anatomists had fallen. "De Vulneribus Capitis," Mediol. 1584, 4to. In this work the author has collected all that was worthy notice on the subject in earlier writers, and added much from his own practice. "Exenteratio Cadaveris illust. Cardinalis Borromæi," 1584, 4to. Douglas Bibliog. Haller Bib. Anat. et Chirurg.

CARCANO, **ACHILLES**, born at Milan in 1556, received the rudiments of his education under his father, an eminent surgeon in that city. He was afterwards admitted of the university, and having taken his degree of doctor in medicine, went to Pavia, where he was engaged in teaching the practice of medicine. He died at Milan in 1588. His only work is an edition of the aphorisms of Hippocrates, digested under proper heads, with practical observations, printed 1581, 8vo. Ticini. Haller Bib. Med.

CARCANOSSI, in *Geography*, a province of Madagascar to the south of the river Metanengha.

CARCANTIA, in *Ancient Geography*, a place of Italy in Infubria, on the route of the Gauls in their passage over the Cottian Alps. Anton. Itin.

CARCAPULI, in *Botany*, Bauh. hist. 1. p. 137. Rai. hist. 1661. *Cambogia gutta*. See **GAMBOGE** and **GARCINIÁ**.

CARCAR, in *Geography*, a town of Spain, in Arragon, on the Ega; 3 leagues from Calahorra.

CARCARA, a town of Italy, in the duchy of Monteferrat, on the river Bormia; 12 miles E. of Ceva.

CARCARAN, or **CARCARAVAT**, a river of South America, in Paraguay, which discharges itself into La Plata.

CARCARIAS CANIS, in *Ichthyology*, a synonymous name of one or two different species of the shark tribe among old writers; sometimes applied to *SQUALUS galeus*.

CARCARIOLA, in *Geography*, a town of Naples, in the province of Abruzzo Citra; 22 miles W. of Aquila.

CARCASE, the corpse, or body of a dead animal. The carcase of a fowl, capon, partridge, leveret, rabbit, &c. is what remains thereof, after the four members, or limbs, viz. the legs and wings, have been cut off.

CARCASE, in *Architecture*, is the shell or ribs of a house; containing the partitions, floors, rafters, &c. made by the carpenter, &c. The carcase is otherwise called the FRAMING.

CARCASO, in *Ancient Geography*, now *Carcassone*, a town of Gallia Narbonnensis, belonging to the Volsci Tectosagi, according to Pliny. Cæsar, in the third book of his "Bell. Gall." says, that this town furnished him with troops at the time of his war in Gaul.

CARCASS, in French CARCASSE, in *War*, is sometimes a hollow case formed of ribs of iron, and covered over with pitched cloth, &c. about the size of a shell; and sometimes is entirely of iron, like a shell with two, three, or four holes in it for the fire to blaze through. Carcasses are filled with various matters and combustibles for the purpose of setting fire to houses when thrown out of mortars. They were formerly of an oval form, made of iron bars, and filled with a composition of mealed powder, saltpetre, sulphur, broken glass, horn-shavings, pitch, turpentine, tallow, and linseed oil, covered with a pitched cloth. They were primed with mealed powder and quick match. The flights, however, of the oblong ones were so erroneous and uncertain, that they have been totally laid aside; and none but the round ones

are used at present. The following is nearly the manner of preparing them.

Boil 12 or 15 lb. of pitch in a glazed earthen pot, or vessel; mix with that 3 lb. of tallow, 30 lb. of powder, 6 lb. of saltpetre, and as many stopins as can be put in. Fill the carcass before the composition is cold, to do which, smear your hands with oil, or tallow, and fill the carcass one third full with the said composition. Then put in loaded pieces of musquet or pistol barrels, or loaded grenades, filling up the intervals between these with part of this composition, and cover the whole over with coarse cloth well sewed together, keeping it as nearly as possible in a round or globular figure. Then put it into the carcass, having a hollow top and bottom with bars running between them to hold them together, and composed of four slips of iron joined at top, and fixed at the bottom at equal distances to a piece of iron, which together with the hoops, when filled, form a complete globular body. When it is quite finished, and cold, it must be steeped in melted pitch, and then instantly immersed in cold water. Lastly, bore three or four holes at top, and fill them with fuze-composition, covering them with pitch until the carcass is going to be used. Carcasses are thrown out of mortars, and weigh from 50 to 230 lb. according to the mortars employed for throwing them. A carcass for the sea-service differs from a common shell of the same size only in the composition it is filled with, and the four holes in it, from or through which it burns or blazes when fired.

The following is a Table of experiments that were made with round case carcasses at an elevation of 45°.

No.	Nature or size of mortar.	Weight of the carcass.		Quantity of powder.	Time of flight in seconds.	Time of burning in minutes and seconds.		Length of priming.	Range.	Remarks.
		lb.	oz.	lb.	sec.	min.	sec.	inches.	feet.	
1	10	62	13	0	8	6	3	0	27 $\frac{7}{16}$	Burnt well in general. Fired from 7 to 9 o'clock in the morning. There was a good light.
2	10	64	12	0	12	8	3	12	27 $\frac{7}{16}$	
3	10	70	0	1	0	10	3	40	27 $\frac{7}{16}$	
4	10	71	12	1	4	11 $\frac{1}{2}$	4	0	27 $\frac{7}{16}$	Fired from 2 to 4 o'clock in the morning. It was very dark. Gave a very good light.
5	10	72	0	1	12	13	4	18	27 $\frac{7}{16}$	
6	10	68	10	2	0	14	4	45	27 $\frac{7}{16}$	
7	8	33	7	0	6	6	3	4	27 $\frac{7}{16}$	Fired from 10 o'clock at night to 2 in the morning. Had a very good effect.
8	8	36	12	0	10	8	3	20	27 $\frac{7}{16}$	
9	8	35	8	0	14	12	5	0	27 $\frac{7}{16}$	
10	8	34	14	1	0	14	3	40	27 $\frac{7}{16}$	
11	8	32	12	1	4	13	5	10	27 $\frac{7}{16}$	

The following is a Table of experiments made with thirteen inch round iron carcasses fired from a thirteen inch sea-service mortar at Woolwich in 1773.

Empty.			Full.			Powder.	Elevation.	Range.	Remarks.
cwt.	qr.	lb.	cwt.	qr.	lb.	lb. oz.	deg. min.	feet.	
1	2	27	1	3	12	30	0 45	0 8700	} One small piece burst from the carcass and fell at the distance of 4500 feet; the other piece contained the composition. The two last did not break.
1	3	1	1	3	14	30	0 41	0 9000	
1	3	3	1	3	6	30	0 42	0 10200	
1	1	4	1	3	17	30	0 42	30 10500	

Carcasses, it is said, were first made use of by the bishop of Munster at the siege of Groll, in 1672, where the duke of Luxemburg commanded.

CARCASSEN, in *Geography*, a town of Spain in Valentia, seated in the valley of Xucar.

CARCASSONE, anciently *Carcafo*, a town of France, and principal place of a district in the department of the Aude, formerly the capital of a county called Carcasséz, and before the revolution the residence of a governor, and the see of a bishop, suffragan of Narbonne. It is divided by the river Aude into the upper and lower town, both of which are encompassed by a wall. The former is situated on an eminence, and has a castle which commands the whole town, and an ancient cathedral. The lower town is more considerable, and is regularly built in the form of a large square. Its streets are straight, and intersect one another at right angles, and they lead to a large square in the centre, where is a fountain formed of rock-work, and having on the top of it a figure of Neptune. The quays are ornamented with rows of trees, which form agreeable walks. The town has a considerable manufacture of cloth; and the adjacent country, which is mountainous, abounds with olive-trees and vines, and affords a fine marble, called "the marble of Languedoc." Carcassone suffered very much on occasion of the crusade that was undertaken against the ALBIGENSES in the beginning of the 13th century; and after having been invested by Simon de Montfort, who directed and commanded the military operations of the church, A.D. 1209, was allowed to capitulate on condition that the inhabitants should evacuate it in a state of nudity; nor was Agnes the viscountess, though young and beautiful, exempted from this ignominious and shocking punishment.

The place is said to contain 15,219, and the canton 18,516 inhabitants; the territory includes $142\frac{1}{2}$ kilometres and 8 communes. It is 12 leagues W. from Narbonne, 19 S. E. from Toulouse, 15 N. E. from Foix, and 160 S. from Paris. N. lat. $43^{\circ} 11'$. E. long. $2^{\circ} 25'$.

CARCATHIOCERTA, in *Ancient Geography*, a town of Asia, in Greater Armenia, near the Tigris, according to Pliny. It was a royal city of the country called "Sophena," according to Strabo.

CARCATTY, in *Geography*, a town of the island of Ceylon; 35 miles N. W. of Trincomaly.

CARCAVEE, a town of Istria; 5 miles S. S. W. of Capo d'Istria.

CARCAVELOS, a village of Portugal in the vicinity of Lisbon, between which and the town of Oeyras is produced the sweet wine, called in England Lisbon, in Germany Portugieswein, and in the country itself wine of Carcavelos. The vineyards are inclosed in quintas, on a gentle declivity towards the sea, and the must is generally sent to Lisbon, where it is made into wine. This wine which is generally white, and best of that colour, is drunk in the country in great perfection, nor can the adulterated liquor sold in foreign countries under that name be compared to it.

CARCAVI, PETER DE, in *Biography*, was born at Lyons, and became counsellor to the parliament at Toulouse. He was the friend of Fermat, who at his death left to him the care of his writings; and after the death of Merfennus he corresponded with Des Cartes, with whom he became acquainted in 1646. At the time of his correspondence, or about 1649, he was settled at Paris, where he became counsellor to the grand council, and keeper of the king's library till the death of M. Colbert. He was also the particular friend of Pascal and Roberval. Interfering

with some warmth in the dispute that took place between the last of these mathematicians and Des Cartes, the correspondence between him and Des Cartes was broken off. He was distinguished by his great knowledge of books, antiquities, and medals. On the establishment of the French Academy in 1666, he was appointed geometer. He died at Paris in 1684. Gen. Biog.

CARCERES, in *Antiquity*, were the lists, or barriers of the circus, within which the horses were confined, till the signal was given by the magistrate for starting.

The word is Latin, supposed to be formed a *coercendo*, as they served as a restraint to the horses ready to run. In the olympic games a stretched cord, called "balbis" served this purpose. Livy says, that the Romans disused the balbis of the Greeks, A. U. C. 425, and constructed carceres in their room.

The number of carceres was twelve. In the early days of Rome they were made of wood, which Claudius afterwards changed for marble. They were kept fast with bolts, sustained by ropes, which, the moment the signal was given, flew open all at once. Some think that only four were used at a time. Suet. in Claud. cap. xxii. n. 6. See CIRCUS maximus.

CARCHA, in *Ancient Geography*, *Kark* or *Eski-Bagdad*, a town of Asia, in Assyria, seated on the eastern bank of the Tigris, about 50 leagues S. of Niniveh, and 25 N. of Bagdad.

CARCHEMISH, or CARCAMIS, a town of Asia, seated on the Euphrates and belonging to the Assyrians. Whilst the Assyrians were defending themselves against the Scythians, who had conquered the whole of Upper Asia, Pharaoh-Necho, king of Egypt, laid hold of this favourable opportunity for recovering the city, which was then subject to the king of Assyria. The garrison, which he left in it, was cut in pieces by Nebuchadnezzar in the fourth year of Jehoiakim, B. C. 606 (2 Chron. xxxv. 20. 2 Kings xxiii. 29.). Carchemish is probably the *Cercusum*, *Circesium*, or *Circeium* of profane authors, seated in the angle formed by the junction of the Chaboras or Chebar with the Euphrates.

CARCHERD, in *Geography*, a town of Persia, in the province of Chorasan; 45 miles N. W. of Herat.

CARCHI, in *Ancient Geography*, a people of Asia in Media, according to Polybius.

CARCHI, in *Geography*, a small fertile island in the Mediterranean sea, near that of Rhodes.

CARCICIS portus, in *Ancient Geography*, *Cassis*, a port of Gallia Viennensis, nearly S. E. of Marseilles, and N. W. of *Cithariste portus*.

CARCINA, or CARCINES, a navigable river of Italy, in the country of the Brutii, between the promontories *Cocinthium* and *Lacinium*, according to Pliny.

CARCINE, or CARCINITIS, the name of a town nearly W. of the isthmus which joins the Crimea to the continent, at the mouth of the small river Calanza.

CARCINITIS Sinus, a gulf of the Euxine sea, between the Tauric Chertoneus and Scythia. Strabo calls it *Tamyragus* and *Carcinites*. It was afterwards called *Necro-Pyla*.

CARCINIUM Opalinum, in *Zoology*. See DAGYSA.

CARCINOMA, in *Surgery*, the same as a *cancer*, which was named *καρκινωμα* by the Greeks, from *καρκινος* a crab, and *ωω* I gnaw or corrode; hence comes the word *carcinomatous* or *cancerous*. See CANCER.

CARCINUM, in *Ancient Geography*, a town of Italy in Brutium, probably the same with "Carcinus," placed by Pomponius Mela in the gulf of Squillace.

CARCOMA, a port-town of Africa, S. W. of the promontory

montory *Apollinis*. Ptolemy places it immediately after *Cartenna* and *Carepula*.

CARCOTÆ, a people of Sarmatia in Europe, who inhabited that part of the country which was in the vicinity of the *Carbones*, according to Ptolemy.

CARCRAIG, in *Geography*, a small island of Scotland, in the Frith of Forth; 7 miles S. E. of Dumferline.

CARCUNAH, a town of Africa, in Ethiopic Barbary.

CARCUS, in *Ancient Geography*, a name given by Ptolemy to an island of the Indian Ocean, which he places near Taprobana.

CARCUVIUM, a place of Spain, in Lusitania, according to the Antonin. Itin.

CARD, in the *Manufactures*, an instrument consisting of a block of wood, beset with sharp teeth, serving to arrange the hairs of wool, flax, cotton, and the like; of which there are different kinds, as stock-cards, hand-cards, wool-cards, tow-cards, &c. The word seems formed from the Latin *carduus* (*fullonum*) which denotes the fuller's teazle; a kind of thistle whose head is used to smooth and range the nap of cloth, &c. Skin. Etym. Angl. in voc.

They are made in the following manner. A piece of thick leather, of the size of the proposed card, is strained in a frame, and then pricked full of holes, into which are inserted the teeth or pieces of iron wire. The leather is then raised by the edges to a flat piece of wood, in the form of an oblong square, about a foot long and half a foot broad, with a handle placed in the middle of one of the longer sides. The method of making the teeth is as follows: when the wire is drawn of the intended size, a number of wires is cut into proper lengths by means of a gage, and then doubled in a tool contrived for that purpose; after which they are bent into a proper direction by means of another tool, and they are then fixed in the leather. See CARDING, CLOTH, and COTTON *Manufacture*.

Cards for wool in England, may not be imported, nor the wire taken out of old cards, to be put into new leather and boards, in order for sale; upon forfeiture thereof, or of the value, if not seized; but may be amended for the proprietor's own use, or for transportation only.

CARD-playing. See CARDS.

CARDALENA, in *Ancient Geography*, a country of Arabia Felix. Pliny.

CARDAMENE, or CARDAMINA, an island of the Arabic gulf on the coast of Ethiopia. It was separated by the isle of the Magi from the Trogloditic territory, according to Ptolemy and Pliny.

CARDAMILIA, in *Geography*, a town of European Turkey, in the Morea; 14 miles S. W. of Militra.

CARDAMINDUM, in *Botany*, Few. peruv. 3. tab. 8. and 2. tab. 42. See *Tropæolum majus* and *peregrinum*.

CARDAMINE, (*καρχαμίνη*, a diminutive of *καρχαμύς*, the Greek name of the water-cress, the nasturtium of the old botanists; *silybrium nasturtium* of Linnæus.) Tourn. Cl. 5. §. 4. gen. 5. Linn. gen. 812. Schreb. 1088. Willd. 1237. Juss. 239. Vent. 3. 105. Gært. 833. Class and order, *tetradynamia filiquosa*. Nat. Ord. *filiquosæ*, Linn. *crucifera*, Juss. *cruciform* of Tournefort.

Gen. Ch. *Cal.* Perianth four-leaved; leaflets oblong-egg-shaped, obtuse, somewhat spreading, gibbous, small, deciduous. *Cor.* four-petalled, cruciform; petals inversely egg-shaped, oblong, wide-spreading, ending in erect claws, which are twice the length of the calyx. *Stam.* Filaments six, awl-shaped; of these, two opposite ones are twice the length of the calyx, the rest a little longer; anthers small, heart-shaped, oblong, erect. *Pist.* Germ slender, cylindrical, the length of the stamens; style none; stigma ob-

tusely headed, entire. *Peric.* Silique long, the shape of a compressed cylinder, two-celled, two-valved; valves opening from the base with a spring, and rolling spirally backwards. *Seeds* many, roundish.

Eff. Ch. Valves of the silique opening from the base with a spring, and rolling spirally backwards. Stigma entire. Calyx rather gaping.

Obs. There is a variety of one species, in which the two shorter stamens are wanting.

* *Leaves simple.*

Sp. 1. *C. bellidifolia*, daisy-leaved or alpine cress. Linn. Sp. Flora Lapp. Ed. 2. 222. tab. 9. fig. 2. Flor. dan. tab. 20. Jacq. Misc. v. 1. 148. tab. 17. fig. 2. "Leaves egg-shaped, quite entire, only a third of the length of the petiole." *Root* perennial, small, somewhat woody. *Stems* scarcely two inches high, erect, simple, few-flowered, smooth. *Leaves* egg-shaped, smooth; radical ones on long petioles; stem ones nearly sessile. *Flowers* in a terminal corymb; petals white, erect, twice as long as the calyx. *Silique* linear, obtuse, smooth. Dr. Smith, Flora Brit. vol. ii. p. 697. Much obscurity hangs over this species. Ray's *C. pumila*, *bellidis folio*, generally quoted as a synonym, Dr. Smith says, certainly does not belong to it, and is probably *arabis stricta*. The only real authority for its being a native of Great Britain is Dr. Withering, who had specimens gathered wild in Scotland by Mr. Milne. All that he says of it is, that the root leaves are on long petioles, and that in its larger growth there are leaves on the stem, but rarely with petioles. Willdenow describes two plants, nearly allied to each other, but, as he supposes, distinct species. One with the flowering stem not longer than the root-leaves, and either naked or with one or two leaves on long petioles; the other with the flower stem longer than the root-leaves, and with stem-leaves nearly sessile. The former, a native of Lapland and Norway, he calls *bellidifolia*; the latter, a native of the Alps, he calls *alpina*. La Marck makes it an *arabis*, but it does not seem to be the *arabis bellidifolia* already described in this work. 2. *C. asarifolia*, *asarabacca*-leaved cress, Linn. Sp. Pl. (*Nasturtium montanum*, *asari folio*; Bocc. Sic. 5. tab. 3. Herm. Par. tab. 203. Rai hist. 816. *Nasturtium alpinum*, *palustre rotundifolium*, *radice repente*; Morif. hist. 2. p. 224.) "Leaves simple, somewhat heart-shaped." *Root* perennial, thick, sending out numerous fibres. *Stems* about six inches high. *Leaves* petioled, a little scolloped, smooth. *Flowers* white. *Siliques* long, burling at the least touch when ripe. It possesses the qualities of scurvy-grass in a greater degree than the other species of cardamine, and is often substituted for it. A native of Savoy, Tuscany, &c. 3. *C. nudicaulis*, naked-stemmed cress, Linn. Sp. Pl. Gmel. Sib. 3. p. 273. n. 43. "Leaves simple, lanceolate, scolloped-toothed; stems naked." *Stems* about nine inches high. *Leaves* about three inches long, smooth, firm. *Siliques* slender, striated, smooth, compressed between the seeds. A native of Siberia. 4. *C. nivalis*, Willd. Pallas. itin. 2. App. 4. 113. t. u. Germ. tom. 3. Pl. 17. p. 264. French. Transf. "Stem and root-leaves simple, oblong, toothed. Whole plant smooth. *Root* perennial. Root-leaves lessened at the base into a petiole; stem-leaves sessile. *Flowers* small, white. *Siliques* reflexed. 5. *C. petraea*, Linn. Sp. Pl. "Leaves simple, oblong, toothed." This species is omitted by La Marck and Willdenow. Willdenow says it is a dubious plant, all the synonyms certainly belonging to *arabis hispida*. This, with respect to the Welsh and Scotch supposed synonyms, is confirmed by Dr. Smith. But on his authority we have retained the species; for he speaks of the true Swedish *C. petraea* of Linnæus in terms implying a satisfactory

satisfactory acquaintance with the plant, which we presume is preserved in the Linnæan herbarium. See English Botany, p. 469. The *C. petræa* of Lightfoot is there described, and figured as a new species under the name of *C. hastulata*. But before the publication of the Flora Britannica, Dr. Smith was convinced that it is properly an arabis, and nothing more than a variety of arabis hispida, and of the Welsh plant miscalled *A. petræa*, by Dillenius, Hudson, and Withering. As such it appears in the latter masterly work. We now perceive that in the article arabis, we have been led into an error by following professor Martyn, who thought the stricta of Hudson, and the hispida of Linnæus, to be the same plant.

** *Leaves ternate.*

6. *C. refedifolia*, Linn. Sp. Pl. (Nasturtium alpinum minus, refedifolio; Bauh. pin. 104. Bocc. Mus. 2. tab. 46.) "Lower leaves undivided; upper ones three-lobed and winged." Root biennial. Stem four or five inches high, slender, smooth, feeble. Root-leaves petioled, egg-shaped or spatula-shaped, entire. Flowers small, white. Siliques slender, an inch long. It has some resemblance to *C. bellidifolia*, but is constantly distinguished by its winged stem-leaves, the terminal leaflet of which is larger than the others. Lam. A native of the Pyrenées, and of the Swiss and German Alps. 7. *C. trifolia*, Linn. Sp. Pl. (Nasturtium alpinum trifidum; Bauh. pin. 104.) "Leaves ternate, obtuse; stem almost naked." Root perennial. Stems several, six or seven inches high. Root-leaves ternate; leaflets a little angular, smooth, on a reddish petiole; stem-leaves one or two; leaflets narrow. Flowers white or reddish, in terminal clusters. Siliques oblong, swollen with the seeds. A native of the Alps. 8. *C. scutata*, Willd. Thunb. Linn. Soc. Trans. 2. p. 399. "Leaves ternate, scutate, curled; stem almost naked." Perennial. A native of Japan. 9. *C. africana*, Linn. Sp. Pl. Tourn. 225. Vahl. Symb. 2. p. 77. (Nasturtium africanum; Herm. Par. 202. tab. 202. Pluk. Alm. 152. tab. 101. f. 5.) "Leaves ternate, acuminate; stems much branched." Root perennial. Stems nine inches or a foot high, erect, angular, hairy. Leaves on long petioles; leaflets petioled; the terminal one large, bluntly serrated, with scattered hairs about the veins. Flowers in corymbs or racemes, small. Siliques an inch and half long, compressed. A native of Africa.

*** *Leaves winged.*

10. *C. chelidonia*, Linn. Sp. Pl. Pallas it. 3. 34. Lour. Coch. 398. (*C. glabra, chelidonii folio*; Tourn. Inst. 224. Silymbrium montanum latifolium: flore purpureo, Bar. ic. 156. Nasturtium Pyrenæorum, Herm. par. tab. 204.) "Leaves winged; leaflets in fives, gashed." Root perennial. Stem about nine inches high, nearly smooth, with many ascending branches. Leaflets, especially the terminal one, remarkably large, roughish, with short hairs. Flowers large, purplish white, in terminal corymbs, lengthening into spikes; petals obtuse or slightly emarginate, twice the length of the calyx. A native of the Pyrenées, Italy, and Siberia. 11. *C. thaliæroides*, Willd. La Marck. Allion ped. tab. 57. fig. 1. (*C. Plumieri*; Vil. delph. 3. tab. 38. Nasturtium thaliætri folio; Bocc. Mus. 171. tab. 116.) "Leaves simple, ternate and winged; leaflets in fives, obtuse, three-lobed." Root biennial. Stems about four inches high, slender. Root-leaves often ternate, on rather long petioles; terminal leaflet large, three-lobed; lateral ones irregularly egg-shaped; upper stem-leaves in fives. Flowers white, twice as long as the calyx. Siliques an inch long, slender, a little compressed, with eight or ten reddish seeds. A native of Piedmont and Dauphiny. 12. *C. macrophylla*, Willd. (*C. chelidonia*, Pal. it. 3, p. 34. Le-

pic, it. 1. p. 243. Silymbrium pinnis ovatis serratis; Gmel. Sib. 3. tab. 62.) "Leaves winged; leaflets in fives or sevens, egg-shaped, acuminate, unequally toothed." Root perennial. Stem a foot high. A native of Siberia. 13. *C. impatiens*, Linn. Sp. Pl. Eng. Bot. Pl. 80. "Leaves winged, stipulate; leaflets mostly gashed, numerous; petals caducous; siliques erect." Root annual. Stem from twelve to eighteen inches high, remarkably stiff in its general habit, upright, more or less zig-zag, angular, hollow, smooth. Leaves alternate, nearly smooth, pale, extended at the base into two narrow, acute, singularly ciliated stipules not found in any other known species. Flowers small, scarcely longer than the calyx, soon falling off, so that the plant has been thought to be without petals by Linnæus, Pollich, and Leers. A native of mountainous countries in several parts of Europe: about Matlock bath in Derbyshire, Kilnsey cragg in Wharfedale, Yorkshire, and plentifully in Westmoreland and Cumberland. It is scarce in the south of England, but we gathered it last summer (1805) about the skirts of Wichberry wood, near Hagley, Worcester-shire. 14. *C. parviflora*, Linn. Sp. Pl. "Leaves winged without stipules: leaflets lanceolate, obtuse." Root annual. Stem shorter and less acutely angular than that of *C. impatiens*. Petals not caducous. Siliques erect, on horizontal peduncles. If two species have not been described by different authors under the same name, the leaflets of the upper stem-leaves vary in being either lanceolate or linear, perfectly entire, or a little toothed. It is now generally agreed that what several English and German botanists have taken for the parviflora is only a variety of hirsuta. A native of the south of Europe, and Siberia. 15. *C. pennsylvanica*, Willd. "Leaves winged; leaflets angularly toothed, obtuse." Whole plant smooth. Stem erect, branched. Leaflets five or seven, with two large teeth on each side, giving them an angular appearance; those on the highest leaves lanceolate, obtuse, perfectly entire; the terminal one wedge-shaped, often trifid. Siliques narrow, erect. 16. *C. græca*, Linn. Sp. Pl. "Leaves winged; leaflets palmate, equal, petioled." Root annual. Stems five or six inches high, slender, branched. Leaflets from seven to thirteen, petioled, obtuse, cut into three or four lobes, so as to appear palmate. Siliques from twelve to fifteen lines long, straight, compressed, sword shaped. A native of Sicily, Corfica, and the Grecian islands. 17. *C. hirsuta*, Linn. Sp. Pl. Hal. helv. n. 472. Eng. bot. 492. "Leaves winged; leaflets roundish, obtusely angular, petioled." Root annual. Stems from three to twelve inches high, more or less zig-zag, clothed with scattered prominent hairs. In moist situations, and especially in wet ditches, it rises to eight or nine inches high, and has, we believe, constantly six stamens, and a strong, rather unpleasant smell and taste. On dryish ditch-banks, and in fallow fields where it often occurs, its stem is much shorter, and its flowers have only four stamens, but its root-leaves are often very luxuriant, yet considerably milder, and are a good ingredient in a spring salad. Linnæus's specific character was formed from the latter variety, whence Withering and Lightfoot mistook the former for his parviflora, which has not been found in England; and Withering, after he discovered his error, thought it a new species which in the third edition of his Botanical Arrangement he called flexuosa. Dr. Smith first determined them to be one species; and in confirmation of his judgment, we once found, in a kind of intermediate situation between wet and dry, several specimens which had tetrandrous, hexandrous, and, in two or three instances, pentandrous flowers on the same plant. 18. *C. latifolia*, Willd. Vahl. Symb. 2. p. 77. "Leaves winged; leaflets five, somewhat angularly toothed, smooth." Whole plant smooth. Stem a foot high, simple, ascending. Leaves

petioled, remote; leaflets oblong, unequal at their margin, with one or two teeth. *Flowers* in a corymb, numerous; peduncles an inch long; leaves of the calyx oblong, with a membranous edge; petals three times the length of the calyx, purple, slightly emarginate. Vahl. A native of Spain. 19. *C. pratensis*. Ladies'-mock, cuckow-flower, milk-maid. Linn. Sp. Pl. Curt. Flor. Lond. fasc. 3. tab. 40. Mart. Flor. inf. tab. 40. Mart. Flor. inf. tab. 95. Woodv. Med. tab. 30. Eng. bot. 776. Flor. Dan. tab. 1039. "Leaves winged: radical leaflets roundish, those on the stem lanceolate." *Root* perennial. frequently toothed in some degree like that of coral-wort. *Stem* about a foot high. erect, stiff, simple. *Leaves* winged: root ones on long petioles, somewhat lyrefhaped; leaflets somewhat hairy; stem ones sessile, alternate; leaflets smooth, channelled, generally entire. *Flowers* large, purplish or white, in a handsome terminal corymb, becoming double by cultivation. The colour and appearance of the flowers, the style rather more lengthened than in any other species of Cardamine, and above all a tendency of the leaves in wet shady places to bear bulbs, shew an affinity to the genus Dentaria or coral-wort. It has the same sensible qualities as the Sisyrium nasturtium or water cress, but in a very inferior degree. The flowers have obtained a place in the British Pharmacopœias on the authority of Sir George Baker, who recommended them to be taken internally in spasmodic disorders: they have even been said to cure the epilepsy, but experience has not confirmed their reputation. They were prescribed dried, which Dr. Smith observes, is not an advantageous state for plants of this natural order. See Dr. Smith in English botany, and Woodville's Medical Botany. A native of wet meadows in many parts of Europe. 20. *C. amara*, bitter cress. Linn. Sp. Pl. Curt. Flor. Lond. fasc. 3. tab. 39. Eng. Bot. 1000. "Leaves winged: root leaflets roundish, stem ones angularly toothed. Stem taking root at the base. Anthers violet-coloured." *Root* perennial, toothed. *Stems* procumbent at the base, and taking root in the mud, then upright, a foot high or more, somewhat zig-zag. *Leaves* nearly smooth. *Flowers* large, white or cream-coloured; style a little elongated and oblique. Found on the banks of rivers and brooks in several parts of Europe, but not so common as the preceding. On the banks of the Thames about London, of the Aire, Eure, and other rivers in Yorkshire, King-street meadows near Norwich, and in Scotland. 21. *C. granulosa*, Willd. Allion, pedem. (Nasturtium pratense odoratum radice granulis tuberosa; Bauh. pin. 104.) "Root-leaves simple, roundish, on long petioles; stem-leaves winged; leaflets lanceolate; root granulated." *Root* perennial. *Stem* near half a foot high, erect, simple. *Root-leaves* entire, decurrent into the petiole; stem-leaves obtuse, entire. *Flowers* white; petals obtuse, not emarginated, three times as long as the calyx. A native of meadows near Turin. 22. *C. virginica*, Linn. Sp. Pl. (Alyssum, Gron. virg. 1. p. 170. Nasturtium burfæ pastoris folio; Pluk. Alm. 251. tab. 101. fig. 4.) "Leaves winged; leaflets lanceolate, one-toothed at the base." *Root-leaves* spread into a circle; leaflets numerous, almost imbricated; stem-leaves few, often linear, entire. La Marek thinks it a true Arabis. A native of Virginia. 23. *C. furmentosa*, Forst. Flor. austr. n. 529. Found by Forster in the island of Teautca in the South Seas.

The varieties of pratensis and amara with double flowers may be readily propagated by parting the roots. They thrive best in shady situations.

CARDAMINE alpina 3-minima; Clus. hist. See LEPIDIUM alpinum.

CARDAMINE pusilla saxatilis montana discoides; Col. ecph. tab. 273. See LEPIDIUM petraeum.

CARDAMINE stolonifera; Scop. Flor. Carn. and Martyn's Miller. See ARABIS Halleri.

CARDAMOM: for the botanical characters, see AMOMUM cardamomum and repens.

The Cardamomums imported into Europe have been commonly distinguished by the epithets, Majus, Medium, and Minus: but the species from which the two former are produced have been so imperfectly described, and their botanical history is so confused, that nothing decisive can be said concerning them. One of the three is probably the Cardamomum of Linnæus. The seeds of the Minus, which are now generally preferred for medical purposes, are said by Sonnerat to be the produce of his A. repens, discovered by him on a mountain on the coast of Malabar, where it grows so plentifully as to supply all India with its seeds, and which on that account is called the mountain of Cardamoms. It is figured in Woodville's medical botany. They are brought to Europe in their natural husk or pod, without which they would lose a part of their flavour, and this is divided internally into three cells, in each of which are contained two rows of triangular seeds, brownish on the outside and white within. These seeds have an extremely grateful aromatic smell, and when chewed, they impart a glowing warmth, and grateful pungency to the mouth. Their virtue is extracted both by alcohol and by water; the former giving a clear, the latter a turbid solution, both yellowish. The watery infusion is highly mucilaginous. When these seeds, previously bruised, are distilled with water, a small quantity of essential oil, about $\frac{1}{4}$ th of the weight of the seeds, on an average, may be separated, and in this seem to reside all the aromatic qualities. It is of a pale yellow, very acrid, and strongly smelling of the cardamom. The watery solution inspissated yields a gummy-resinous extract; the spirituous solution gives a resinous extract much less in quantity. Neither of them are used.

Cardamom is one of the most grateful of the mild aromatics, and is used either to flavour other medicines, or as a stimulant and cordial. It agrees in general particularly well with dyspeptic stomachs, and prevents the griping or nauseating effects of many of the saline or other purgatives. A tincture is made of it both simple and compounded with carraway, cinnamon, and cochineal. Cardamom also enters the composition of some other aromatic preparations.

The seeds of the Cardamomum Majus, denominated also Grana Paradisi or Marieguetta, Greater Cardamon Seeds, are hard reddish-brown angular seeds, much larger than the last-mentioned, about the size of radish seeds, generally imported without the husk, from the East Indies. The smell and flavour of these are much less aromatic and grateful than those of the lesser seeds, and the taste is hot, biting, and somewhat coarse. It yields an essential oil not very acrid, but the watery and spirituous solutions are both highly pungent. These seeds are but little used. See Lewis's "Materia Medica," and Woodville's Medical Botany.

CARDAMUM, in Geography, an island situate in the passage from Malacca to the straits of Sincapore, or South end of Malacca straits.

CARDAMYLA, in Ancient Geography, a town of Messenia, almost south of Gerenia. It was one of the seven cities which Agamemnon wished to present to Achilles. Pausanias speaks highly of the temple of Minerva and a statue of Apollo "Carneus," the worship of whom was common to all the Dorians. This town was detached by Augustus from Messenia, but afterwards restored to its original masters, the Lacedæmonians.

CARDAN, JEROM, in Biography, a voluminous philosophical and medical writer, was born at Pavia Sept. 24th, 1501. His father, who was an eminent civilian, and a distinguished

guished scholar at Milan, took the charge of his education, in the early part of his life, and he particularly instructed him in mathematics, astronomy, and judicial astrology. He is said not to have been born in wedlock, and in the account he gives of his own life he says, his mother, when pregnant with him, endeavoured to destroy him, by procuring abortion. She was a woman of strong passions, and he probably derived from her that versatility of disposition, and violence of temper, which prevented his reaping the advantages he might have obtained from his genius and learning. At the age of 20 he entered the university of Pavia, where he prosecuted his medical and philosophical studies with success; he then went to Padua, in 1524, and in 1525 he took the degree of doctor in medicine. In 1529 he repaired to Milan, but was some time before he acquired any credit in his profession; he was therefore reduced to great difficulties. His first appointment was that of professor of mathematics, for which he was peculiarly qualified, and a few years after, viz. in 1539, he was admitted a member of the medical college in that city. This brought him into notice; but that he was not at peace with his brethren, appears by his two first publications, "*De malo recentiorum Medicorum mendendi usu*," Venet. 1536; and "*Contradictentium Medicorum Libri duo*," Lyons, 1548: in the first he severely censures the practice of his contemporaries; in the other the inconsistent and often contradictory accounts of the same disease, given by the most accredited writers, even among the ancients. In 1547 the king of Denmark, on the recommendation of Vesalius, invited him to accept the office of a professor in the university of Copenhagen, with a handsome salary; the offer was, however, refused, his time, we may presume, being now more advantageously employed in practice. The reputation he had acquired in this way occasioned his being sent for to Scotland, about this time, to attend Hamilton, archbishop of St. Andrews, and brother to the regent, who was afflicted with asthma, for which he had before tried the assistance of the physicians to the king of France, and the emperor, but without receiving any benefit. Cardan was more successful, for by the end of about two or three months the archbishop was so much relieved, as to allow him to return to his own country, having received a large remuneration for his services, and liberal offers to retain him in Scotland. On his return he passed through London, and is said to have cast the nativity of our king, Edward VI.; but we do not learn that he foretold the short date of that monarch's existence. At Milan he continued to reside until 1559, his time being employed in the practice of medicine, and in teaching mathematics; from 1559 to 1562 he resided at Pavia, being invited to accept the chair of professor in medicine there; and from 1562 to 1570, at Bologna, where he filled a similar office. He was now, for what cause we are not informed, thrown into prison, but as he was soon liberated, we may suppose for no very serious offence; for though haughty and turbulent, he seems generally to have acted with sufficient caution, as in whatever country he resided, he was never seriously embroiled with the church or state. It appears, also, that he had the faculty of attracting the notice, and procuring the friendship of those persons who, by their wealth or power, were most able to support him, but by the waywardness of his disposition he soon lost their favour; hence he was always in a state of indigence, which he relieved by sending to the press some hasty effusions, which had no more of his care than it cost him to write them over. His works, therefore, which were collected after his death, and which fill ten massive folio volumes, consist of such a confused and undigested medley, that it would require more labour to put them into order than their intrinsic value would compensate. Soon after be-

ing released from prison, he was sent for to Rome, was made member of the college of physicians there, and assigned a pension by the pope, which he retained to the time of his death, Sept. 21st 1576. It has been said, that he starved himself, in order to verify his own prediction of the time of his death; but this is improbable, because he had long before acknowledged the failure of a similar prediction. Thuanus, however, relates (lib. 62. p. 155.), that this fact was believed. Scaliger asserts it; and it is said that his father died in the same manner, in 1524. Of him it is also said, that his eyes were white; and that he saw in the night time, and could see without spectacles. Cardan "*De Vita propria*," p. 10. His reigning passion, if we believe his own account, was a desire to acquire and communicate knowledge. Though a large portion of his life was passed in a state of indigence, yet it did not appear to depress his spirits. He considered knowledge, of which he could not but be conscious he had a large share, as infinitely preferable to wealth. That he had no mean opinion of his own talents, or of his value to the community, seems evident by the following, supposed to have been written by himself, and intended as his epitaph:

"Non me terra teget, celo sed raptus in alto,
Illustris vivam, docta per ora virum.
Quidquid venturis spectabit Phœbus in annis,
Cardanus noscet, nomen et usque suum."

Vanity seems to have been with Cardan a predominant passion; for though with apparent frankness he recites the various adventures of his life, which shew the inconstancy of his temper, he nevertheless conceals or palliates others, which are more dishonourable. Addicted from his youth to judicial astrology, he pretends to deduce, by means of his skill in this science, from the imaginary influence of celestial bodies, an apology for the licentiousness of his opinions, and the eccentricities of his conduct. Such was his confidence in the conclusions furnished by this art, that in his treatise entitled "*Explicatio Genituræ*," or a calculation of nativity, he hazards many predictions concerning his own character and fortune, as well as others that related to Jesus Christ. Whilst he acknowledges a propensity to irreligion, and advances some sentiments that subject him to the suspicion, if not to the direct charge, of atheism, he justly incurs the reproach of credulity and superstition. Having been accustomed, in consequence of his father's instruction, at eight in the morning on every first of April to repeat a prayer and an Ave, he conceived that he was thus secure of obtaining any favour he should ask. From numerous prodigies that occurred, both sleeping and waking, he pretended to infer what should befall him; and he sometimes seems to intimate, that, like Socrates, he was attended by a particular genius. Whilst he boasts of certain supernatural gifts that were bestowed upon him, he must either be conscious of wilful falsehood, or labour under a fanatical derangement of the understanding. Indeed, many have supposed that the preponderance of his imagination over his judgment did actually produce a species of insanity. At the same time he affected singularities of dress and of behaviour, which seemed to indicate a degree of studied artifice and imposture. Under the influence of strong passions, he was frequently betrayed, notwithstanding his distinguished abilities and erudition, into errors of judgment and irregularities of conduct, which tarnished the lustre of his other laudable qualities, depreciated his character, and proved occasions of perplexity and unhappiness to himself. These errors and irregularities aggravated, in no small degree, his domestic distress. One of his sons married a woman, destitute both of fortune and reputation, and determined to get rid of her by poison, he was convicted, condemned, and executed. Cardan attempted to justify this atrocious crime,

on the ground of the wife's infidelity; and pretends that the divine vengeance pursued the judges of his son for their sentence against him. Another son behaved so ill, that he was obliged to imprison, and at length to discard and disinherith him.

In his medical profession, Cardan was a sagacious observer, and an industrious collector of facts; but he was at the same time so boastful and so credulous, as to claim little or no confidence. He wrote on every branch of medicine; but the volumes in which he treats of natural history, which give accounts of extraordinary cures, or descriptions of unusual or preternatural productions, have been received with the greatest favour, and have been the most frequently reprinted. His accounts, however, under these heads, must not be always implicitly admitted; the greater part of these will be found in his treatise "*De Varietate Rerum*," fol. Bas. 1550, and again 1557. In his "*Commentaries on the Apriorisms of Hippocrates*," 1553, 4to. Patav. he records a case of a wound in the pericardium, in which the patient recovered, and of a person who lost a portion of the brain, equal in size to a hen's egg. The man lived three years after the accident, but in a state of fatuity. In his "*Domo rustica*," Strasb. 1589, fol. he describes the diseases incident to cattle, with the manner of treating them. The 8th book of his treatise "*De Subtilitate*," published 1550, is entirely botanical, and contains descriptions of numerous plants, then first introduced into Italy. In his "*De Chinæ et Sarsaparillæ Radicibus*," 8vo. 1566, he describes the manner of preparing the decoction of those roots, and of administering them. In his "*Opuscula Artem Medicam exercentibus utilissima*," are some curious observations on the external application of cold water, which he had witnessed in Scotland; and extraordinary praises of the internal use of the pure element in fevers and other diseases. His "*Ars curandi parva, quæ est absolutissima medendi Methodus*," Basil, 1566, 2 vols. gives his general method of cure in diseases, with many particular observations. His "*Opus novum de Sanitate tuenda ac Vita producenda*," a posthumous work, published in 1580, fol. contains a copious enumeration of articles of diet, and of directions for the mode of living, blended with much idle and superstitious matter. For an account of his other medical works, &c. see Haller Bib. Med. pract. chirurg. anat. et botan. or Eloy's Dict. Histor. The cures which he undertook to perform by secret charms, or by the assistance of invisible spirits, gained for him with the vulgar, the reputation of a magician; but in reality they were only evidences of a mind infatuated by superstition.

In mathematical science Cardan claims a tribute of more unrestricted commendation. In algebra particularly he challenges the honour of having made some important discoveries; though his pretensions, as an original inventor, have been contested by Tartaglia. These discoveries are contained in the 10th book of his Arithmetical writings, which was published at Milan in the year 1545. See ALGEBRA. In order to justify Tartaglia's prior claim, it has been alleged, that in a trial of skill with Antonio Maria del Fiore or Florido, he had discovered the general theory of equations of the third-degree. The occasion of it was this: Florido had received from his master Scipion Ferreo, about 30 years before, a general rule for resolving a particular case of cubic equations, expressed by $x^3 + bx = c$. Presuming on this discovery, Florido provoked Tartaglia into a contest, in which each should propose to the other 30 questions; and he who first resolved them within a limited time, was to win the proposed wager. Tartaglia, eight days before the stipulated time, discovered not only the mode of resolving the case of Florido, viz. $x^3 + bx = c$, but also the case $x^3 =$

$bx + c$. On the day of meeting, Tartaglia resolved all his adversary's questions in the space of two hours, without receiving one answer from Florido in return. Accordingly, the wager was decided in his favour, and he generously remitted the forfeit incurred by Florido. Cardan, who was preparing a large work in arithmetic, algebra, and geometry, having heard of Tartaglia's discoveries in cubic equations, was very anxious for obtaining his rules of solution, that he might insert them in his proposed work. After several urgent invitations, he at length prevailed on Tartaglia to pay him a visit at Milan in the year 1539; and in a conference, induced this mathematician to furnish him with his rule, which he did in 27 rude Italian verses; but he first exacted from Cardan a promise on oath that he would not publish what he disclosed to him. Some difficulty afterwards occurring in the explication of these verses, and in the use of the rule conveyed by them, Cardan obtained from Tartaglia the solution he requested. For some time Cardan kept his promise, though not without some suspicions on the part of Tartaglia, with regard to his integrity. At length, however, when in 1545 he published his work entitled "*Ars magna*," he inserted in it the solution of Tartaglia, attributing it to the inventor. Tartaglia complained of Cardan's violation of faith; and he justified himself by saying, that the additions which he had made to Tartaglia's method of solution, gave him a right to publish it. To this purpose Montucla observes, that Cardan had in fact the merit of partly extending, and much illustrating the theory of Tartaglia. The dispute between them was long and acrimonious, and terminated only with the life of Tartaglia in 1557. The rules which occasioned this contest, have, however, retained the name of Cardan: although it would be more equitable to give them the title of the formula of Tartaglia, since they were originally his. For a further account of this controversy, and of the letters that passed between the disputants, we refer to Montucla's Hist. Math. tom. i. p. 591, &c. and Hutton's Math. Dict. art. Algebra.

The philosophical notions of Cardan, both as they respect matter and mind, are principally detailed in his works "*De Subtilitate*," and "*De Varietate Rerum*;" but they are so blended with fanatical visions, and the most extravagant and delirious effusions of mystical folly, and so ill digested and arranged, that they cannot be easily explained or understood. They form a kind of confused medley, distinguished more by an affectation of novelty and singularity, and by the indulgence of an unbridled imagination, than by a sound and discriminating judgment; and for want of methodical arrangement, they contribute little to the promotion of important and useful science. They are, however, occasionally intermixed with experiments and observations on natural phenomena; and they are chiefly useful as by the freedom and boldness with which the author divulged them, they serve to emancipate the human mind from the fetters of ancient authority. Upon the whole, Cardan, notwithstanding the variety and apparent originality of his writings, must be ranked among the unsuccessful adventurers in philosophy. Of his peculiar dogmas, the following may serve as a specimen. "Primary matter, which remains immutably the same, fills every place, whence, without the annihilation of matter, there can be no vacuum. Three principles subsist every where; matter, form, and mind. There are in matter three kinds of motion; the first, from form to element; the second, the reverse of this; the third, the descent of heavy bodies. The elements, or passive principles are three; water, earth, and air; for naturally all things are cold, that is, destitute of heat. The agent in nature

nature is celestial heat; the air, being exposed to the action of the solar rays, is perpetually in motion. The moon, and all the other heavenly bodies, are luminous from themselves. The heavens are animated by an ever active principle, and are therefore never quiescent. Man, having mind as well as soul, is not an animal. The dispositions of men are produced, and all moral affairs are directed by the influence of the stars. The mind is universally diffused, and though it appears multiplied, is but one; it is extrinsically, and for a time, attached to human bodies, but never perishes."

In his book above-mentioned, "*De Subtilitate*," Cardan compares the dogmas of various religions, and the arguments for them, and it is said, puts the weaker in the mouth of the Christian. The works of Cardan, treating of metaphysics, logic, natural philosophy, medicine, mathematics, and morals, were collected by Spon, and published in ten volumes folio, Leyd. 1663. Of his numerous and multifarious publications, one reason is assigned from his own confession, that his poverty induced him to fill up his sheets, with which he supplied his bookseller at a fixed price, with any thing that occurred to him. To this circumstance some have ascribed the various discussions and consequent obscurity that have puzzled his readers. He was attacked with much acrimony by several writers, and particularly by J. C. Scaliger, who is said to have envied his philosophical reputation and medical success. Brucker's *Hist. Phil.* by Enfield, vol. ii. p. 518. Gen. Dict. Mosheim E. H. vol. iv. p. 163. Haller's *Bib. Med. pract. Chirurg. Anat. et Botan.*, et Eloy. Dict. *Hist.*

CARDANO, in *Geography*, a town of Italy, in the duchy of Milan, seated on the Arno.

CARDASS, a sort of card, proper for carding flocks of silk, to make cappadine of it. It is also the name which the French give to those flocks of silk.

CARDASSES is also the name which, in the cloth manufactories of Languedoc, they give to a sort of large card, which is used for carding the dyed wool, designed for making cloth of mixed colours.

CARDAVA, in *Ancient Geography*, a town placed by Pliny in the interior of Arabia.

CARDEN, in *Geography*, a town of Germany, in the circle of the Lower Rhine, and electorate of Treves, seated on the Moselle; 27 miles N.E. of Treves.

CARDENNOSSA, a town of Spain, in Old Castile; 4 leagues from Avila.

CARDERS, in the *Woollen Manufactory*, are persons who prepare wool, &c. for spinning, &c. See *CARDING* and *CLOTH*.

Carders, spinners, weavers, fullers, sheermen, and dyers, not performing their duty in their occupations, shall yield to the party grieved, double damages; to be committed until payment. One justice to hear and determine complaints.

Carders, combers, sorters, spinners, or weavers, conveying away, embezzling, or detaining any wool or yarn, delivered by the clothier, or any other person, shall give the party grieved such satisfaction as two justices, mayor, &c. shall think fit: if not able or willing to make satisfaction, for the first offence to be whipped, or set in the stocks in some market-town, or in any other town where the offence is committed: the second offence to incur the like, or such further punishment, by whipping, &c. as justices shall think proper. Conviction by one witness on oath, or confession.

CARDI, LUDOVICO, called *Cigoli* and *Civoli*, in *Biography*, an eminent historical painter, a scholar of Santi di Titi, gave a new style to the Florentine school, and, though he did not approach nearer to the style of Correggio than any of his contemporaries, as Baldinucci expresses himself, he ac-

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quired very considerable eminence in his art. He availed himself with success of Correggio's chiaroscuro, joined to it skill in design which he acquired from the antique statues, and from the works of Michael Angelo, Buonarrotti, and other masters in correct drawing, and set it off by judicious perspective, and a much more lively colour than that of the Tuscan school; nevertheless, his pictures do not exhibit that contrast of tints, that impasto, that splendour, that graceful air, those bold fore-shortenings, which constitute the character of the head of Lombard art. Whilst the general tone of his colour is Lombardesque, his draperies resemble those of Paolo Veronese, and he sometimes approaches the depths of Guercino. To the class of his excellent pictures, possessed by the grand duke of the Peccori family, and dispersed through private collections at Florence, we may refer his Trinity, in the church of St. Croce, his St. Albert, in that of St. Maria Maggiore, the Martyrdom of Stephen, at the Sisters of Monte Domini, which Pietro da Cortona ranked with the principal pictures at Florence. St. Anthony converting a Heretic is considered as superior to any other at Cortona. His St. Peter healing the Cripple, in the Vatican at Rome, is placed by Andrea Sacchi next to the Transfiguration of Raphael and the St. Jerom of Domenichino. The merit of this picture, now indeed utterly destroyed by the humidity of the place, and other circumstances, procured him the title of Cavaliere. This great artist also engraved a few plates in a slight, neat style, evincing, however, the hand of a master. Among others is a small plate representing "Mary Magdalen washing the Feet of Christ, at the Table of Simon the Pharisee." The heads of the figures, which are numerous, are remarkably beautiful; particularly those of our Saviour and Mary Magdalen. He died at Rome in 1613, aged 54. Pilkington and Strutt.

CARDIA, in *Anatomy*. See *STOMACH*.

CARDIA, in *Ancient Geography*, a town situated near the Chersonesus of Thrace, at the bottom of a gulf, and to the west of the isthmus, which joins the peninsula to Thrace, near the mouth of the Melas. It derived its name, according to Pliny, from its being built in the form of a heart. This city was considerable, when it was surrendered to the Athenians, at the time of the contest of the king of Thrace with Philip. They founded colonies in it, in order to secure the possession of it, but afterwards abandoned it. Lysimachus, the successor of Alexander, demolished it, and from its ruins raised the city of Lysimachia, in the isthmus of the Chersonesus. It probably recovered itself, as Ptolemy, five centuries after the reign of Lysimachus, represents it as a town. There were medals of this city in silver, bronze, and gold, with the symbol of a heart.

CARDIAC, or *Cordial Medicines*, those substances which, by their stimulant operation, excite an agreeable sensation of warmth in the stomach, and give it a temporary degree of tone. Hence they are also called *stomachic*. The sensation of warmth is produced partly by the peculiar impression of these substances on the nervous coat of the stomach, and partly by the accelerated circulation in its vessels, which necessarily occasions a greater evolution of caloric. In consequence of the general sympathy of the different organs of the body with the stomach, this stimulant operation is communicated to the heart and arterial system, and to the brain or common sensorium; whence the spirits are raised, a greater propensity to motion and active thought is produced, and the general sensations of the whole frame are rendered more pleasurable. That this extension of the effect takes place in consequence of nervous sympathy, and not by any actual communication of the cordial substance to the different parts by the vessels, is

evinced by the instantaneous manner in which it is effected. Farther than this, we know nothing of the mode in which this operation is accomplished; it can only be stated, as an ultimate fact, that such a relation between the substances, which come under this denomination, and the living body, exists. No hypothesis, such as the older physicians adopted, of a chemical combination of the medicine with the fluids or solids of the body, or of a mechanical action of the one upon the other, renders the operation in the least degree more intelligible.

Although the terms *Cardiac*, from the Greek, καρδια, and *Cordial*, from the Latin *Cor*, (both signifying the heart,) imply the same thing; yet a distinction seems to be generally made at present in their application: the term *cardiac* being confined more particularly to aromatic substances, and *cordial* being used, as including essential oils, vinous and spirituous liquors, and other diffusible stimulants.

The operation of aromatic substances and essential oils is considerably different from that of vinous and spirituous liquors. The stimulus of the former is more confined to the stomach; they do not affect the sensorium, so as to produce intoxication; they leave a less uneasy sensation, when their operation ceases, and therefore produce less necessity for a repetition; and they are much less pernicious to the constitution, as they do not seem, when taken in excess, to occasion those morbid derangements of the viscera, (especially of the liver,) which are among the most common and fatal consequences of the abuse of wine and spirits.

Cordials, in moderate quantities, are beneficial in debilitated habits, especially where the digestive powers are weak. They give a temporary strength to the system; and, by their stimulus to the secretory vessels of the stomach, they increase the secretion of the gastric fluid, and thus, by promoting the formation of a nutritious chyle, tend to add a permanent strength to the body.

In the treatment of particular diseases, they may be advantageously combined with the more permanent tonics, as in hysteria, chlorosis, epilepsy, and some others, in which great nervous mobility prevails; with diuretics, in the dropsies of old people and of debilitated constitutions; and with narcotic medicines, such as digitalis, cicuta, &c. which are liable to excite nausea, or otherwise to disagree with the stomach. In the last stages of putrid diseases, as they are commonly called, such as typhous fever, putrid sore-throat, confluent small-pox, &c. they are of incalculable utility, (particularly wine,) and afford the last resources for supporting the sinking powers of life, and for sustaining that force and regularity of circulation, which is necessary to the performance of the functions.

CARDIAC orifice, of the stomach, in *Anatomy*, is the opening by which the œsophagus communicates with that receptacle. It is called also the œsophageal, the superior, or the left opening of the stomach. See *STOMACH*.

CARDIAC opening of the diaphragm, is the superior of the two openings formed between the appendices or crura diaphragmatis, and transmits the œsophagus, together with the right and left nerves of the eighth pair, or par vagum. See *DIAPHRAGM*.

CARDIACA, in *Botany*, Hall. Helv. n. 274. See *GALEOBDOLO*.

CARDIACA, Hall. Helv. n. 275. See *STACHYS sylvatica*.

CARDIACA, Amm. Ruth. 49, 50. Mil. Icon. 80. See *LEONURUS tataricus*.

CARDIACA, five *Leonurus*. Pluk. Alm. 81. tab. 118. fig. 4. See *PHLOMIS zeylanica*.

CARDIACA, Herm. Lugd. 115. tab. 117. See *PHLOMIS repetifolia*.

CARDIACUS Plexus, in *Anatomy*, is formed by the nerves which supply the heart, and which are derived from the superior and inferior cervical, and first dorsal ganglia of the great sympathetic nerve, from the par vagum and the recurrent nerve. See *HEART* and *NERVES*.

CARDIALGIA, in *Medicine*, a term formerly used in a more general sense to designate any pain or uneasiness about the region of the stomach, especially if connected with a tendency to syncope (Sauvages Nosol. Meth. cl. vii. ord. 4.); but at present confined to that painful sensation of heat and acrimony about the superior orifice of the stomach, which, from the vicinity of its seat to the heart, is popularly called *heart-burn*. The term is from καρδια, which signifies both the heart, and upper orifice of the stomach, and αλγος, pain.

This painful sensation is produced by the irritation of an acid matter in the stomach, which rises to the upper orifice, sometimes by eructation into the œsophagus and throat, and is sometimes completely ejected by vomiting. That this irritating matter is of an acid nature, is evinced by the taste; and it has even been seen to produce an effervescence on falling on a marble hearth, according to Dr. Darwin, (*Zoonomia*, class I. 2, 4, 5.). When vomited, or raised by eructation, it is sometimes so intensely sour, as to abrade the mouth and throat; and, in general, it produces a sensation in these parts similar to that which exists in the stomach.

The production of the acid is thus accounted for. It has been ascertained by the experiments of Spallanzani and others, that the process of digestion is effected by means of the solvent powers of the gastric juice; and that, during health, while it is perfectly performed, no degree of fermentation occurs. But when, from a deficiency of the solvent fluid, or some morbid change in its qualities, digestion is delayed or imperfectly accomplished, the natural chemical changes, which a mass of animal and vegetable matter is disposed to undergo, ensue, fermentation takes place, and an acid is consequently evolved. It is obvious, therefore, that *cardialgia* is not to be considered as a distinct species of disease, but as one of the symptoms of indigestion, or of the weakness or inactivity of the stomach; and it is produced by all the causes of indigestion. See *DYSPEPSIA*. Particular kinds of food, however, are liable to produce *cardialgia*, in those who are pre-disposed to indigestion, rather than the other symptoms which often attend it; such are hot new bread, especially of the coarser kinds, rich pastry, &c. It is a very common symptom of that morbid condition of the stomach, which exists in the early and last stages of pregnancy.

The complaint may be palliated by mucilaginous matters, such as Spanish liquorice, or gum Arabic, which sheath the irritated parts, and, by supplying the deficiency of mucus, preserve the sensible membranous lining of the stomach from the acrimonious fluid.

It may be certainly relieved, and, if slight, may be effectually cured, by the use of such medicines as may combine with, and neutralize the acid, from which it originates. For this purpose the vegetable or fossil alkalies may be employed in various forms; the soda-water, as a common drink, is a convenient form: the absorbent earths, as magnesia, chalk, &c. will answer a similar end. But where the complaint is severe, or of some standing, the only effectual method of cure consists in removing that state of debility of the stomach on which the indigestion depends. This must be effected by temperance and exercise, with the assistance of tonic

tonic and stimulant medicines, such as steel, colombo, and other bitters, with a moderate portion of wine and aromatics. Care should be taken not to charge the stomach with a larger quantity of food than it can readily digest, since the overplus will necessarily tend to fermentation.

Dr. Darwin remarks, that as the saliva, swallowed along with our food, prevents its fermentation, according to the experiments of Pringle and Macbride, considerable relief is sometimes found by chewing parched wheat or mastic, or a lock of wool, frequently in a day, when the pain occurs, and by swallowing the saliva thus effused.

CARDIFF, or CAERDYFF, in *Geography*, the county-town of Glamorganshire, South Wales, derives its name from its situation on the river Taf, which runs along the west side of it, and falls into the Severn, three miles below the town. It consists of several spacious streets of well-built houses, and is pleasantly situated on a fertile flat, two miles and a quarter from the eastern extremity of the county, where it is joined by Monmouthshire. The town was formerly surrounded with walls flanked with watch-towers, 1280 paces in circumference, and had gates at the four cardinal points, some traces of which are still visible. Cardiff consists of two parishes, St. John's and St. Mary's, though there is at present but one church: for the church of St. Mary was, in 1607, undermined and thrown down by the inundations of the river, which still occasionally repeats its depredations. The high tower of the present church was built, it is said, at the latter end of the reign of Edward III. It is of light appearance, and of elegant workmanship: having open corners and lantern pinnacles. Here were formerly four religious houses: a benedictine priory, and houses of black, grey, and white friars. Those of black and white friars were founded by Robert earl of Gloucester, and continued, till the dissolution, under Henry VIII. A few remains of the white friars are still to be seen; and the ruins of the black friars are near the eastern wall and gate-way, and furnish habitations for a few poor fishermen. The chief object of attention is the ancient castle, which is a large, stately edifice, on the north side of the town wall. It was originally of great strength, and is said to have covered eight acres of ground. It was built by the conqueror Fitzhamon, in 1090, after he had possessed himself of the country of Morgannoc. The entrance is by a bold gate-way, furnished with two portcullises and massy gates. The ruins of the castle have been repaired and modernized under the present possessor, the marquis of Bute. On the keep, which stands in the centre of the inclosed area, is a handsome octangular tower; and a high terrace is carried round the inside of the whole extent of the embattled walls that surround it. This castle, situated in the midst of the Anglo-Norman territory, experienced but few of those incidents so common to many others. It is memorable as the scene of the unjust imprisonment and death of Robert duke of Normandy, by his brother Henry I. In May 1645, it was garrisoned by the Welsh loyalists for the king; but in August the following year, after sustaining a short siege, surrendered to the parliamentary forces. The inhabitants of Cardiff and its vicinity carry on a considerable trade to Bristol, and send thither great quantities of oats, barley, salt butter, and poultry of all kinds. The iron-works of the adjacent country have greatly added to the consequence of this town, nearly 9000 tons of cast and wrought iron being exported annually for London and other places. By an act which passed in 1790, a canal was cut from Penarth Point to the Cyfartha iron works, near Merthyr Tidvil; which has greatly facilitated the conveyance

of so ponderous an article of commerce to market: this canal was brought, with great ingenuity, through a mountainous country, to the extent of twenty-five miles; its head, at Merthyr Tidvil, is 568 feet higher than the tide lock at Cardiff. By a subsequent act a branch has been extended to other works at Aberdare, while the division of the line below the town has been widened and deepened, so as to admit brigs and other vessels of 300 tons burthen up to the quay. See *Glamorganshire CANAL*. The assizes are regularly held at Cardiff; and the beauty of the neighbourhood is sometimes displayed at its concerts and assemblies. By the late return the population of this town is 1870, and the number of houses 327. It is 160 miles W. from London, and has two weekly markets on Wednesdays and Saturdays.

About three leagues south of Cardiff are two islands, called the Flat and Steep Holmes; on the former of which there is a light-house, and a good dwelling, where pilots frequently wait to conduct ships up the Bristol channel: this island contains sixty acres of land, and is well cultivated. A little to the west of these islands is a small one called Sully; and three miles westward of that is another named Barry, from St. Baruch, who is said to have been interred there. Evans's *Tour through South Wales*, 8vo. 1804. Malkin's *Scenery, Antiquities, &c. of South Wales*, 4to. 1804.

CARDIGAN, in Welsh *Aberteivi*, is the county-town of Cardiganshire, in South Wales. The houses stand on the declivity of a hill, at the bottom of which runs the river Teifi or Tivy, which has at its mouth a dangerous bar. This is navigable at high tides for brigs of 150 tons burthen, which are laden and unladen at the quay. Previous to the war here was a considerable export trade to Ireland, &c. in lead and corn; but the iron works in the vicinity furnish it, at present, with its chief commerce. About two miles from the town the river discharges itself into Cardigan-bay. A bridge of seven arches crosses the river, and near it stands the shell of a castle, which is said by many writers to have been built by Gilbert de Clare, who also fortified the town, in the time of Henry II. Powel, however, in his "*History of Wales*," asserts, that a castle was built here, in 1155, for the defence of the borders. This was besieged by Rhys Gryffydd, in 1164, when it was taken, and razed to the ground. In 1176, Cardigan was a scene of peculiar public festivity, when numbers of English, Welsh, Irish, and Normans, assembled to celebrate a grand eisteddfod. The bards and minstrels of the principality displayed pre-eminent skill on this occasion. They, consequently, record the approbation and thanks of the assembly; and, being victors, were rewarded with honorary presents. In the poetical class, the bards of North Wales were declared the most eminent; and, in music, the minstrels of South Wales proved themselves the conquerors.

On the banks of the river stands the church, a large handsome structure; and near it are the ruins of a priory of black canons. In 1797, a new county-gaol was erected in this town. Cardigan is noted as the place where Gyraldus preached, and strongly recommended the crusade to the ancient Britons. Though the county-town, Cardigan has but little to recommend it to the attention of the historian or antiquary. Its houses and shops are upon a very small scale, and its local trade is but very inconsiderable. In conjunction with the outlying boroughs of Aberystwith, Lampeter, and Adpar, this town sends one member to parliament. The number of voters amounts to about 1200. Cardigan gives the title of earl to the family of Brudenel. Here are a weekly market on Tuesdays, and four fairs yearly. Evans's *Tour through South Wales*, 8vo. 1804. Malkin's *Scenery, Antiquities, &c. of South Wales*, 4to. 1804.

CARDIGAN, a name once given to the township Orange, in America, about 20 miles E. of Dartmouth college, in New Hampshire. See ORANGE.

CARDIGAN bay, a bay of the Atlantic, on the west coast of Wales, W. and N.W. of the town of Cardigan. This bay is very extensive, and is bounded by the coast of Pembroke which forms one horn of it, and by the extreme point of Caernarvonshire terminating in the isle of Bardsea, which forms the other.

CARDIGANSHIRE, a county of South Wales, is a long narrow district bordered to the west by that part of St. George's channel, called Cardigan-bay. On this coast the sea has made great encroachments, and according to the tradition of the country, a large tract of land, well inhabited, has been swept away by the waves. This coast is particularly animadverted on by some of the ancient Welsh bards. The other boundaries of the county are, Merionethshire and Montgomeryshire on the north, Radnorshire and Brecknockshire on the east, and Caermarthenshire and Pembrokeshire on the south. The area measures about 40 miles in length, by 20 in breadth. This district is divided into five hundreds; and contains six market-towns, and 64 parishes, which are included in the diocese of St. David's. Cardiganshire may be properly divided into two districts, and characterized by the lower, and the upland. The higher grounds of the former consist of a light sandy loam, varying in depth from twelve to four and five inches; the substratum is a flaty kind of rock. The soil of the upland district is extremely shallow, and in general very barren. Indeed this mountainous region is naturally uncongenial to the pursuits of agriculture; yet the genius and industry of men might effect much, particularly by judicious plantations. This is laudably exemplified in the grounds at and about Hafod, where the patriotic proprietor, Thomas Johnes esq., has rendered fertile and useful many thousand acres of land. The scenery of Hafod, the Devil's bridge, and their vicinities, is singularly grand, picturesque, and romantic. This northern part of the country abounds with deep narrow chafms between the mountains, through which the waters often rush with great impetuosity; and particularly after storms, or continued rains, when they form immense torrents, and in many places are precipitated in roaring cascades. "The whole of this rugged region," observes Mr. Malkin, "is one immense reservoir of metallic treasure, awaiting only the spirit of enterprise, and the hand of industry to draw it into light and use;" but the pursuits of agriculture have hitherto superseded those of commerce. The principal rivers of this county are the Rydol, the Ystwith, and the Clewedog. Malkin's Scenery, Antiquities, &c. of South Wales, 4to. 1804.

CARDINAL, a term serving to express the relation, or quality of prime, principal, or most considerable. The word is formed of the Latin *cardo*, a hinge; it being on these fundamental points that all the rest of the same kind are supposed to turn. Thus, justice, prudence, temperance, and fortitude, are called the four *cardinal virtues*, as being the basis of all the rest.

CARDINAL flower. See LOBELIA DORTMANNI.

CARDINAL Points, in *Cosmography*, are the four intersections of the horizon with the meridian and the prime vertical circle. Of these, two, viz. the intersections of the horizon and meridian, are called *North* and *South*, with regard to the poles they are directed to.

To determine the places of these points, see MERIDIAN line.

The other two, viz. the intersections of the horizon and first vertical, are called *East* and *West*.

The cardinal points, therefore, coincide with the four cardinal regions of the heavens; and are 90° distant from each other. The intermediate points are called COLLATERAL POINTS.

CARDINAL Points of the Heavens, or, of a Nativity, in *Astrology*, are the rising and setting of the sun, the zenith and nadir.

CARDINAL Signs, in *Astronomy*, are Aries, Libra, Cancer, and Capricorn. See SIGN.

CARDINAL Winds are those that blow from the cardinal points.

CARDINAL Numbers, in *Grammar*, are the numbers one, two, three, &c. which are indeclinable; in opposition to the ordinal numbers, first, second, third, fourth, &c. See NUMBER.

CARDINAL is more particularly used for an ecclesiastical prince, one who has a voice, both active and passive, in the Roman conclave, at the election of a pope.

Some say, the cardinals were so called from the Latin *incardinatio*, which signifies the adoption in any church made of a priest of a foreign church, driven thence by misfortune; and add, that the use of the word commenced at Rome and Ravenna; the revenues of the churches of which cities being very great, they became the common refuge of the unhappy priests of all other churches.

The cardinals compose the pope's council, or senate: in the Vatican is a constitution of pope John, which regulates the rites and titles of the cardinals; and which declares, that as the pope represents Moses, so the cardinals represent the seventy elders, who under the pontifical authority decide private and particular differences.

Cardinals, in their first institution, were only the principal priests, or incumbents of the parishes of Rome. In the primitive church, the chief priest of a parish, who immediately followed the bishop, was called *presbyter cardinalis*; to distinguish him from the other petty priests, who had no church, nor preferment; the term was first applied to them in the year 150; others say, under pope Silvester, in the year 300. These cardinal priests were alone allowed to baptize, and administer the eucharist. When the cardinal priests became bishops, their cardinalate was vacated; they being then supposed to be raised to a higher dignity.—Under pope Gregory, cardinal priests, and cardinal deacons, were only such priests or deacons as had a church or chapel under their particular care: and this was the original use of the word. Leo IV. in the council of Rome, held in 853, calls them *presbyteros sui cardinis*; and their churches *parochias cardinales*.

The cardinals continued on this footing till the eleventh century; but as the grandeur and state of his holiness became then exceedingly augmented, he would have his council of cardinals make a better figure than the ancient priests had done. It is true, they still preserved their ancient title; but the thing expressed by it was no more. It was a good while, however, before they had the precedence over bishops, or got the election of the pope into their hands: but when they were once possessed of those privileges, they soon had the red hat and purple; and growing still in authority, they became at length superior to the bishops, by the sole quality of being cardinals.

Du-Cange observes, that originally there were three kinds of churches: the first or genuine churches were properly called

called *parishes*; the second, *deaconries*, which were chapels joined to hospitals, and served by deacons; the third were simple *oratories*, where private masses were said, and were discharged by local and resident chaplains. He adds, that to distinguish the principal, or parish churches, from the chapels and oratories, the name cardinals was given them. Accordingly, parish churches gave titles to cardinal priests; and some chapels also, at length, gave the title of cardinal deacons.

Others observe, that the term cardinal was given not only to priests, but also to bishops and deacons who were attached to certain churches; to distinguish them from those who only served them *en passant*, and by commission. Titular churches, or benefices, were a kind of parishes, i. e. churches assigned each to a cardinal priest; with some stated district depending on it, and a font for administering of baptism, in cases where the bishop himself could not administer it.—These cardinals were subordinate to the bishops; and, accordingly, in councils, particularly that held at Rome in 868, subscribed after them. It was not, however, only at Rome, that priests bore this name; for we find there were cardinal priests in France; thus, the curate of the parish of St. John de Vignes is called, in old charters, the cardinal priest of that parish.

The title of cardinal is also given to some bishops, *quatenus* bishops; e. g. to those of Mentz and Milan: the archbishop of Bourges is also, in ancient writings, called cardinal; and the church of Bourges a cardinal church. The abbot of Vendome calls himself *cardinalis natus*.

The cardinals are divided into three classes, or orders; containing six bishops, 50 priests, and 14 deacons; making in all, 70: which constitute what they call the *sacred college*. The cardinal bishops, who are as it were the pope's vicars, bear the titles of the bishopricks assigned to them; the rest take such titles as are given them; the number of cardinal bishops has been fixed; but that of cardinal priests and deacons, and consequently the sacred college itself, is always fluctuating. Till the year 1125, the college only consisted of 52, or 53: the council of Constance reduced them to 24; but Sixtus IV. without any regard to that restriction, raised them again to 53, and Leo to 65. Thus, as the number of cardinal priests was anciently fixed to 28, new titles were to be established, in proportion as new cardinals were created.—As for the cardinal deacons, they were originally no more than seven, for the 14 quarters of Rome; but they were afterwards increased to 19, and after that were again diminished. It has been said, however, (see Mosheim, E. H. vol. ii. p. 485.) that cardinal deacons were not from the beginning members of that sacred college, by whom the popes were elected. Although there were in the Roman church long before the edict of Nicholas (mentioned below), and there still remain, cardinal deacons, i. e. superintendants of those churches which have hospitals annexed to them, and whose revenues are appropriated to the support of the poor; yet they were evidently excluded from the election of the pope, which, by the edict of Nicholas, was to be made by the cardinal bishops and clerks alone. Accordingly we find the cardinals plainly distinguished from the deacons in the diploma that was drawn up for the election of Gregory VII. to the pontificate.

According to Onuphrius, it was pope Pius IV. who first enacted, in 1562, that the pope should be chosen only by the senate of cardinals: whereas, till that time, the election was by all the clergy of Rome. Some say, the election of the pope rested in the cardinals, exclusive of the clergy, in the time of Alexander III. in 1160. And they allege, that,

in order to avoid the usual contentions and disturbances at the election of a pope, he made a decree in the third Lateran council, A. D. 1179, that for the future the right of choosing him should be vested in the cardinals only, and that he should be a lawful pope who had the suffrages of two-thirds of the college of cardinals; which law is still in force. See ALEXANDER. Others go higher still, and say, that Nicholas II. having been elected at Sienna, in 1058, by the cardinals alone, occasioned the right of election to be taken from the clergy, and people of Rome; only leaving them that of confirming him by their consent; which was at length, however, taken from them. See his decree for this purpose, issued in the Roman council of 1059, in Hardouin's *Acta Conciliorum*, tom. vi. pt. i. p. 1165. "We have thought proper to enact," says the pontiff, "that, upon the decease of the bishop of the Roman catholic or universal church, the affair of the election be treated principally, and previously to all other deliberations, among the *cardinal bishops* alone, who shall afterwards call in to their council the *cardinal clerks*, and require finally the consent of the rest of the clergy and the people to their election." Whence it appears, that the cardinals who had the right of suffrage in the election of his successors, were divided by this pontiff into cardinal bishops and cardinal clerks: meaning by the former the seven bishops who belonged to the city and territory of Rome, and to whom it belonged to consecrate the Roman pontiff; and by the latter, the cardinal presbyters or ministers of the 28 Roman parishes, or principal churches. To these were added, in process of time, under Alexander III. and other pontiffs, new members, in order to appease the tumults occasioned by the edict of Nicholas II. Accordingly Alexander completed what Nicholas had only begun, by transferring and confining to the college of cardinals the right of electing to the apostolic see, and excluding the nobility, the people, and the rest of the clergy from all concern in this important matter. In order to defeat the opposition of the higher order of clergy, he augmented the college of the electing cardinals by conferring that dignity upon the prior, or archpresbyter of St. John Lateran, the archpresbyters of St. Peter's and St. Mary Maggiore, the abbots of St. Paul's and St. Laurence without the wall, and, lastly, upon the seven Palatine judges. And the inferior clergy were reduced to silence by the promotion of their chiefs, the *cardinal deacons*, to the dignity of electors. Who it was, whether Alexander III. or some other pontiff, that raised the principal Roman deacons to the rank of cardinals, is not certain; but it is very evident, that the design of this promotion was to put an end to the murmurs and complaints of the inferior clergy, who resented highly the violation of their privileges.

We may conclude, upon the whole, that the college of cardinals, and the extensive authority, and the important privileges enjoyed by them at this day, derive their origin from the edict published at the request and under the pontificate of Nicholas II.; that, under the title of cardinals, this pontiff comprehended the seven Roman bishops, who were considered as his suffragans, and of whom the bishop of Ostia was the chief, as also the 28 ministers, who had inspection over the principal Roman churches; and that to these were added, in process of time, under Alexander III. and other pontiffs, new members, in order to appease the resentment of those who looked upon themselves as injured by the edict of Nicholas, and also to answer other purposes of ecclesiastical policy. It is also unquestionable, that, though the higher order of purpled prelates, commonly called cardinals, had its rise in the 11th century, yet it does

not seem to have acquired the stable and undisputed authority of a legal council before the following age and the pontificate of Alexander III. See CONCLAVE.

The cardinals obtained the privilege of wearing the red hat as an emblem of their readiness to shed their blood for the catholic faith, in consequence of the grant made to them by Innocent IV. at the council of Lyons, in 1245; but they are said to have first used it in the year after the council, i. e. in 1246, on occasion of an interview between the pope and Lewis IX. of France. That the cardinals were allowed to wear red shoes and red garments in the time of Innocent III. raised to the see in 1198, appears from several writers who flourished at that time; but it is not certain which of the popes conferred upon them that distinction. Paul II. elected to the papacy in 1464, added the red cap and scarlet housings for caparisoning their horses when they rode. The decree of pope Urban VIII. whereby it is appointed, that the cardinals be addressed under the title of *eminence*, is of the year 1630; till then, they were called *illustrissimi*.

See further concerning the origin and rights of cardinals in Onuphrius, Duarenus, Ciacconius. Aubery has given the general history of cardinals, in five volumes, 4to.

CARDINAL has also been applied to secular officers.

Thus, the prime ministers in the court of the emperor Theodosius, are called *cardinales*. Cassiodorus, lib. vii. Formul. 31. makes mention of the cardinal prince of the city of Rome; and in the list of officers of the duke of Bretagne, in 1447, we meet with one Raoul de Thorel, cardinal of Quillart, chancellor, and servant of the viscount de Rohan: which shews it to have been an inferior quality.

CARDINAL'S island, in Geography, a small island near the east coast of Labrador. N. lat. 59° 30'. W. long. 63° 50'.

CARDINAL bird, in Ornithology, synonymous with *Cardinalitis* and *Loxia cardinalis*.

CARDINALIS *capitis bone spei*, Briss. and CARDINAL *du cap de bonne espérance*, Buff. See LOXIA *orix*, the grenadier of English writers. *Le cardinal* of Buffon is another bird, the Gmelinian *TANAGRA brasilia*, which sec. *Cardinalis purpureus* of Briss. is the *Jacapu* of Marcgrave, *Tanagra jacapa* of Gmelin. *Cardinalis* is also the specific name of several birds in the Linnæan system, as will be noticed in their respective genera.

CARDINALITIUS, a name given by some to the Virginian nightingale, *Loxia cardinalis*, which see.

CARDING, in the *Manufactories*, a preparation of wool, cotton, hair, or flax, by passing it between the iron points, or teeth, of two instruments, called *cards*, to comb, disentangle, and range the hairs or fibres thereof; and to dispose it for spinning, &c. See CARDS.

Before the wool be carded, it is oiled, or greased with oil; whereof, one-fourth of the weight of the wool is required, for wool destined for the woof of stuffs; and one-eighth for that of the warp. See CLOTH.

CARDIOGMUS, or CARDIONCHUS, (compounded of *καρδία*, the heart, and *ὄγκος*, tumour) in Medicine, a dilatation of one or all the cavities of the heart. The term includes two species of disease; viz. a partial enlargement of the heart, forming a sac, in which coagulable lymph is deposited, and which is usually denominated aneurysm of the heart; and that more common disease, which consists simply in a general dilatation of the natural cavities.

The symptoms which belong to aneurysm of the heart are the same as those which accompany aneurysm of the arch of the aorta. (Baillie Morb. Anat. p. 42.) See ANEURYSM.

When the heart, or any of its cavities, is much enlarged, it is attended with severe palpitations, which are excited by the least motion or exertion, and often increase to the most violent and distressing paroxysms; so that they may not only be felt by the hand, when applied to the left side, but at the pit of the stomach, and at the top of the sternum; and they may frequently be perceived by the eye through the ordinary clothing, and occasionally, it is said, may even be heard. The other symptoms are, a sense of weight, and a constant anxiety about the chest; sometimes accompanied with a violent pain across the breast, in the abdomen, or the back; and sometimes with fainting. There is frequently great difficulty of breathing, with a sense of suffocation, which compels the patient to sit in the erect posture, or to seek repose by leaning on his breast. A purplish hue of the cheeks and lips, which varies at times, according to the degree of difficulty with which the blood is transmitted through the lungs; œdema of the face, or other dropical swellings; flatulence of the stomach; and a harassing cough, are occasional symptoms of the complaint. The pulse is various in different instances; sometimes it is feeble, small, and intermitting; sometimes extremely quick and hard; and sometimes not synchronous with the contractions of the heart. When the palpitation is violent, the head is often affected with strong distressing pulsations, which are sometimes more complained of than those of the heart itself.

The *diagnosis* of this affection of the heart is of considerable importance; because the most dreadful palpitations occasionally arise from morbid irritability, independent of organic disease; and the treatment must necessarily be very different in the two instances. The enlargement of the heart is generally perceptible to the hand; its stroke is less pointed, or more obtuse than natural, and is felt two or three ribs lower than in health. But, according to Dr. Ferriar, "the most certain sign of dilatation is the jarring sensation given to the hand by each systole. The stroke seems restrained, and is succeeded by a kind of thrilling, which cannot be clearly described, but is entirely different from the shake of a palpitation." (Med. Hist. and Reflect. vol. i. p. 148.) Senac, with less discrimination, observes, that our principal guide, in determining the dilatation of the heart, must be the force of the palpitations, their continuance, and the facility with which they are excited, especially if accompanied by syncope and dyspnoea. (Traité du Cœur, tom. ii. chap. 8.) The symptoms, however, are sometimes obscure and treacherous.

It is more difficult, and of less importance, to determine which of the cavities of the heart is dilated. Where the auricles only are dilated, probably the pulse will retain its strength, as the ventricles possess their natural power; the palpitation will perhaps be less violent; and the enlargement less perceptible to the hand. (Senac.) And the dilatation may be considered as confined to the auricles, when the pulsation feels remote, and extending across the breast, as well as downwards, and when the apex of the heart does not strike the ribs very forcibly. (Ferriar.) M. Senac has farther observed, that when the right ventricle, or its auricle, is greatly dilated, the palpitations are comparatively trifling; the patients complain chiefly of a sense of weight about the region of the heart; and there is also a pulsation in the veins of the neck.

In several instances there has been a great disposition to gangrene in the extremities, which no medicine could counteract. This arises, no doubt, from the impaired force of the heart. For as its muscular *parietes* are generally very thin, in proportion to the enlarged size of its cavities, the heart has little power to propel an increased quantity of blood into

into the more distant branches of the arterial system. (Morb. Anat.)

In whatever cavity the dilatation exists, the disease is commonly fatal. The patients generally die suddenly, in syncope, or in a paroxysm of palpitation; sometimes in consequence of a rupture of the thin *parietes* of the dilated cavity; but often without any such rupture. The disease, however, is extremely irregular in its progress, and various in its duration. It will sometimes appear to be stationary, or even retrograde, for a long interval, during which the sensations of the patient are tolerably comfortable, and he can use moderate exercise without inconvenience. At other times the paroxysms are frequent, and he seems in perpetual danger of expiring. The duration of the complaint has been observed, in different instances, to vary from two or three months to nine years.

Various *causes* have been assigned for this disease. Senac enumerates in the list, all acute diseases of the lungs, as well as asthma and hydrothorax, fever, violent exercise, or turbulent passions, and excessive intemperance. According to Lancisi, flute-players and preachers are subject to it; and Dr. Pitcairn thinks that he has observed it to arise from a transference of rheumatism to the heart. Dr. Ferriar has seen it produced by raising great weights, or by too long a continuance of much bodily exertion; and all the cases which he has seen have been in young persons. It is probable that any circumstance which either acts as a strong impediment to the free passage of the blood from the heart, or which excites a violent and long-continued afflux of blood to that organ, may, in some constitutions, where there is an original weakness of it, occasion a dilatation.

Little can be said as to the *cure* of dilatation of the heart; for, except in the incipient stage, all that can be done is to soothe the distressing feelings of the patient, to render his existence somewhat more comfortable, and thus perhaps to prolong its duration. With this view, much has often been done by medicine and proper management. The anxiety and palpitation may be alleviated by means of narcotic medicines, especially by digitalis and opium, which diminish the irritability of the heart and arterial system. The digitalis is sometimes extremely useful in this complaint, and has appeared to suspend its progress, and to produce long intervals of freedom from the distressing symptoms. Perhaps it may be serviceable partly as a narcotic, and partly as a diuretic; since diuretics, whatever may be the explanation, give frequent relief in disorders of the chest. All violent exercise, and great emotions of the mind, should be avoided, since they tend to produce inordinate action of the heart. Moderation in diet should be observed, and strong liquors dispensed with; so that the stomach may not, by distention, press upon the heart, and excite it to increased action, and that the body be not heated and stimulated by the quantity or quality of the food and drink. Great flatulence, or other occasional symptoms, must be palliated by appropriate medicines.

It ought not to be omitted, that in the commencement of the disease some physicians have recommended evacuations, especially by bleeding, with a view to remove the fulness of the vessels, and therefore to diminish the mechanical momentum of the blood in the heart, as well as its stimulus to that irritable organ. This doctrine is, however, somewhat questionable. It is justly remarked by Dr. Ferriar, that the symptoms of debility which generally accompany the complaint, even at its commencement, the tendency to deliquium (fainting), the weak flatulent state of the stomach and bowels, the dropical symptoms, owing to a delay in the return of the blood, and the languid feelings of the patient, seem to point out a *careful* exhibition of tonics, as the most probable

means of arresting the progress of the disorder. Analogy corroborates this suggestion; for in other partial congestions, and in palsies, tonics, and even direct stimulants, are given with advantage, to recover the tone of the dilated or ruptured vessels. (Ferriar, loc. cit. p. 168.)

CARDIOIDE, in *Geometry*, a curve so called by Castilliani. It is thus formed; let the diameter A B (*Plate III. Geometry*, fig. 48.) of the circle A M B A, revolve about the point A, and on A B produced let B a, M N, A D, M N, &c. be always equal to A B; then will the point a describe a curve, which from its figure resembling a heart, is called *cardioide*.

From the construction it appears, that $AN = BA + AM$, and that N M A N is always double of the diameter A B, and is bisected by the circle in M.

This curve is algebraical; if $AB = a$, $AE = x$, $EN = y$, its equation will be,

$$y^4 - 6ay^3 + 12x^2y^2 - 6ax^2y + x^4 + 12a^2y^2 - 8a^3y + 3a^2x^2 = 0$$

For the method of drawing tangents, and other properties of this curve, see Phil. Trans. N° 461. sect. 8. See also Mem. Acad. Scienc. 1705, where M. Carré first proposed this curve.

CARDIOSPERMUM, in *Botany*, (*καρδία*, heart, *σπέρμα*, seed, from a heart-shaped spot or scar on the seed). Linn. gen. 498. Schreb. 680. Willd. 789. Gært. 497. Juss. 146. Vent. 3. 126. (*Corindum*, Tourn. La Marck Encyc. *Vesicaria*, Riv. 4. 144.) Class and order, *oëlandria trigynia*. Nat. ord. *trilobata*, Linn. *Sapindi*, Juss. *Saponaceæ*, Vent.

Gen. Ch. *Cal.* perianth four-leaved; leaves obtuse, concave; the alternate interior ones larger than the others. *Cor.* petals four, obtuse, alternate with the leaves of the calyx, equal in size to the two larger ones. *Nectary* four petal-shaped leaflets, coloured, inclosing the germ, shorter than the proper petals, and attached to them; two of them callous at the tip, hooked at the side, forming an upright lip; the others with equal sides forming a closed lip. *Stam.* filaments eight, awl-shaped, nearly as long as the nectary, united below; anthers small. *Pist.* germ three-sided; styles three, short; stigmas simple. *Pericarp.* capsule roundish, three-lobed, inflated, three-celled, opening at the tip. *Seeds* globular, marked at the base with a heart-shaped scar. Gærtner and La Marck consider the fruit as consisting of three connate, one-celled, valveless capsules, united at the axis so as to take the appearance of a three-lobed capsule.

Ess. Ch. Calyx four-leaved. Petals four; nectary four-leaved, unequal. Capsule three-lobed, or rather three connate capsules inflated.

Sp. 1. *C. halicacabum*, Linn. Sp. Pl. Lam. III. Pl. 317. Gært. Pl. 79. (*Halicacabum*, Rumph. Amb. 6. p. 60. tab. 24. fig. 2. *Pisum vesicarium*, Bauh. pin. 743. Sloane Hist. 1. p. 238.) "Stem and petioles smooth; leaflets with gashed teeth, smooth." Willd. *Root* annual. *Stems* three or four feet long, slender, branched, striated, twining. *Leaves* alternate, twice ternate, sometimes slightly pubescent. *Flowers* small, white; common peduncles axillary, solitary, thread-shaped, furnished above the middle with two simple, opposite tendrils, and supporting several flowers near their extremity on short partial peduncles. *Fruit* short, greenish, almost smooth. A native of the East and West Indies; cultivated in England by Gerard in 1594. It flowers here in July. 2. *C. hirsutum*, Willd. "Stem and petioles hairy; leaflets toothed, smooth." *Root* annual. *Stem* four feet high or more, climbing, deeply furrowed, thick set with hairs. *Leaves* alternate, petioled, twice ternate; leaflets egg-shaped, acuminate, two inches and a half long, half an inch broad, simply and coarsely toothed, smooth on both sides, veined; axils of the veins pubescent beneath

C A R D I U M.

beneath; common petiole almost three inches long, furrowed, hairy; partial petiole an inch or half an inch long, semi-cylindrical, not often beset with hairs. *Flowers* similar to those of the preceding species, but larger; peduncles half a foot long, furrowed, smooth. A native of Guinea. 3. *C. corindum*, Linn. Sp. Pl. "Leaves downy underneath." Similar to *C. halicacabum*. *Root* annual. *Peduncles* supporting ten or eleven flowers among the tendrils, remaining, after the fructification is past, rigid. *Capsules* narrower, downy. A native of Brasil. 4. *C. grandiflorum*, Willd. Swartz. Prod. 64. Flor. Ind. Occid. 2. p. 693. "Leaves pubescent; capsules acuminate, very large." *Root* perennial. *Leaves* more acuminate than those of *C. corindum*, and not inclining to heart-shaped at the base. *Flowers* and *fruit* three or four times as large. A native of Jamaica.

CARDISPERMUM. See CALENDULA hybrida.

CARDISSA, in *Conchology*, the name given by Rumphius to the Linnæan *Cardium cardissa*.

CARDITIS, in *Medicine*, the nosological term for inflammation of the heart.

If we consider the nature and importance of the function of the heart, and the connection of the circulation, of which it is the source, with the nervous system, the state of temperature, and every other function of the body, we should be led to expect, *a priori*, that the symptoms accompanying an inflammation of that organ, would be sufficiently obvious, and essentially different from those, which designate an inflammation of any other of the viscera of the thorax. This, however, is very far from being the case. The symptoms which attend inflammation of the heart, are fever, pain in the situation of the heart, palpitations, an irregular pulse, cough, difficulty of breathing, and often syncope. (Baillie Morb. Anat. p. 42.) It is obvious that the symptoms here enumerated are merely the common symptoms of peripneumony, or pleurisy, with the addition of palpitation, irregularity of pulse, and syncope, or fainting. But it is observed by Senac, that these symptoms are extremely uncertain; and with regard to palpitation, although its presence may lead us to suspect that the heart is affected, yet it is probably an hypothetical opinion, since in that inflammation, which arises from wounds of the heart, palpitation does not occur. (Traité du Cœur, tom. ii. chap. 7.) With respect to the other two symptoms it must be remarked, that the presence of an irregular pulse, and the occurrence of syncope, together with the symptoms of pneumonia (or inflammation of the lungs), can only lead to a probable suspicion of an affection of the heart; since they are by no means constant attendants on carditis; and the former very frequently attends other cases of pneumonia. (Wilson on Febrile Diseases, vol. iv.) Upon the same grounds Dr. Cullen accords with the observations of Vogel, that "the symptoms of carditis are nearly the same with those of peripneumony, but in general more severe;" and adds, that he has seen the *pericardium*, or membranous covering of the heart, inflamed, when no other symptoms, but those of peripneumony, had occurred. (Synopsis Nosol. Meth. p. 107. note.) Inflammation of the pericardium, however, cannot be distinguished in practice from inflammation of the substance of the heart. (Baillie, loc. cit.) In fact, inflammation seldom occurs in any part of the contents of the thorax, without spreading to those in contact with it, as from the pleura to the lungs, from the heart to the pericardium and pleura, &c. Hence the diagnosis must be often impossible in many cases, where in reality more than one organ is inflamed.

Were we in possession, however, of any certain means of distinguishing carditis from inflammation of the other thoracic viscera, in a practical point of view it would be of little

use, since the method of cure must be the same, whether the disease be seated in the lungs, pleura, heart, or pericardium. General blood-letting, where the pulse is hard and strong; blisters to the region of the heart; gentle laxatives of calomel or neutral salts; diaphoretics; and diluents; will be the principal expedients: every thing being at the same time avoided which can increase the local or general irritation.

The same causes must be considered as giving rise to carditis, which produce the other modifications of thoracic inflammation; and the same circumstances will direct us in forming our prognosis, and in adopting particular varieties of treatment. See PERIPNEUMONY.

It would appear from dissections, that there is often a slow or chronic inflammation subsisting in the heart, which does not betray itself by any peculiar symptom. For abscesses in the substance of the ventricles, and ulcers on the external surface, have been occasionally found after death, when no symptoms of inflammation had previously existed. (Morgagni Epist. xxv. art. 17. Bonet, tom. i. p. 849, &c.)

CARDITO, in *Geography*, a town of Naples, in the province of Calabria ultra, 8 miles E.S.E. of Reggio.

CARDIUM, in *Conchology*, a Linnæan genus of bivalves, the shell of which is nearly equilateral, equivalent, and in most species, convex, longitudinally ribbed, striated, or grooved, with a dentated margin: hinge with two teeth near the beak, and a larger, remote, lateral tooth on each side in both valves, and which, when the shell is closed, lock into each other. Animal inhabitant of the shell a *tethys*, having two small pores on the left side of the body.

COSTATUM. A large species described by Linnæus that inhabits the African Ocean: the shell is gibbous and equivalent with raised, carinated, concave, membranaceous ribs. Mus. Lud. Utr.—*Concha exotica*, Argenville, Kaman Adanson.—Length three inches; breadth three inches and a half; general colour whitish, with sometimes broad brown grooves or stripes. Called by English collectors the *Piperidged cockle*.

CARDISSA. Shell heart-shaped; valves compressed and carinated with teeth; beaks approximate. Linn.—*Cardissa* of Rumphius, and *Cor veneris* of Argenville.

Smaller than the preceding, the length being only two inches and a half, and the breadth two inches. The ribs are placed obliquely, and there is a conspicuous heart-shaped depression before the beaks; the general colour is whitish, sometimes spotted with sanguineous. Individuals of this species according to Gmelin are occasionally found concave on one side. It inhabits the Indian Ocean.

ROSEUM. Shell heart-shaped; anterior part furrowed with lines, posterior striæ rather broader, and forming by their conjunction a cordated figure; one part convex, the other concave. Argenville, &c.—This inhabits the Nicobar islands, and resembles the former; shell whitish varied with rose-colour.

RETUSUM. Shell heart-shaped; valves striated, crenulated, and slightly carinated, with lunate cordiform gape behind the beaks.—This shell, which is two inches long, and nearly the same in breadth, is of a milky-white colour; thick, with the anterior part concave, and posterior convex; margin with plaited teeth. Inhabits India, Arabia, and Egypt. Born, &c.

HEMICARDIUM. Shell heart-shaped, somewhat quadrilateral; valves carinated; beaks distant. Linn.

This is described as an inhabitant of the Indian Ocean; it resembles *Cardium Cardissa*; and is of an ochraceous colour, a few of the ribs are glabrous, the rest nodulous with intermediate grooves wrinkled and marked with excavated dots; shell within snowy-white.

LINNÆUM.

CARDIUM.

LINEATUM. Shell heart-shaped, carinated, anterior part obliquely truncated, thin, very smooth, snowy with golden-coloured striae; margin denticulated. Kaemm. lab. Rudolst.—Shell above an inch long; its native place unknown.

MEDIUM. Shell somewhat heart-shaped, and slightly angulated; valves angulated, smooth, and fulcated. Linn. &c.

Inhabits American Seas. This resembles *Cardium Hemocardium*; the shell is whitish, and generally spotted with chestnut or brown; ribs numerous; hinge with a single primary tooth.

ACULEATUM. Shell somewhat heart-shaped, with prominent ribs grooved down the middle and beset with large hollow aculeations, and sub-petalous spines towards the circumference. Inhabits the Mediterranean and European seas. This is a large species of a brownish colour, or whitish variegated with brown bands. Found on the British coasts. Donovan. Brit. Shells, &c.

ECHINATUM. Shell somewhat heart-shaped, fulcated, with spinous carinated ribs. Linn. &c.—Inhabits European seas.

Rather resembles the last in figure, but is smaller, and paler in colour; whitish, variegated with brown. Found on the British coasts. Donovan. &c.

CILIARE. Shell somewhat heart-shaped, with triangular elevated ribs beset along the edges with thin spines, Gmel. &c. A native of the African and European coasts; whitish with about eighteen ribs.

CILIATUM. Shell somewhat heart-shaped, with elevated sub-triangular ciliated ribs. Inhabits the North Seas. O. Fabr. &c.

This resembles *Cardium ciliare*, from which it differs, among other particulars, in having about twice the number of ribs: colour cinereous, or greyish-white.

TUBERCULATUM. Shell somewhat heart-shaped, with obtuse, knotty, transversely striated grooves. Linn. Inhabits the Mediterranean sea, and is variously coloured and marked; sometimes white, or whitish with brown bands; sometimes brown with darker bands; ribs from twenty to twenty-three in number, convex, with a few nodosities.

ISOCARDIA. Shell heart-shaped, with arched imbricated scales along the furrows. Linn.

An American species about two inches and a half in length, and two inches and a quarter broad; colour cinereous-white, with a few red spots or clouds; shell within white, and purple in the middle, and a single primary tooth in each valve at the hinge.

FRAGUM. Shell somewhat heart-shaped, and slightly angulated with elevated lunules down the grooves. Linn. *Fragum album* of Rumpf.

Inhabits India. Colour white, with yellow, or sulphur lunules; within snowy; ribs flattish. Perhaps a small variety of the following species.

UNEDO. Shell somewhat heart-shaped, with lunate coloured grooves. Linn.

This inhabits India, and resembles *Cardium fragum*, but is twice as large, and has fewer red scales on the grooves; lips of the anterior edge incumbent.

MURICATUM. Shell somewhat heart-shaped, furrowed, and muricated at the sides. Linn.

A native of the American seas; colour cinereous, white or yellowish, mixed or spotted with bay; margin ferrated; hinge with two red stripes within.

MAGNUM. Shell oblong, with angular grooves ferrated at the side. Linn.

A supposed variety of this species is called the basket

cockle by Martyn. Univ. Conch. *Cardium magnum* inhabits India, and America: the shell is ferrated on the margin with twenty or thirty grooves, and transversely wrinkled. Colour variable, yellowish, ochraceous with dusky spots or tawny, and cinereous with blackish spots; within white.

FLAVUM. Shell somewhat ovate, fulcated, anterior margin scabrous, posterior one toothed. Linn.

A native of India. Back and posterior end generally yellow, and sometimes spotted, the rest white; ribs about twenty-seven in number, of a convex form, with the first five or six armed with sharp spines; twelve or thirteen posterior ones with flat tubercles, the intermediate ones smooth.

LAEVIGATUM. Shell obovate, with obsolete longitudinal striae. Linn.

This kind inhabits the American, Atlantic, and European seas. Length about two inches and breadth nearly the same: colours various, generally brown or testaceous, with darker clouds and spots, and sometimes bands.

SERRATUM. Shell obovate, smooth, with obsolete striae, ferrated at the interior margin. Linn.

A native of the Mediterranean and Indian seas; shell smaller and less convex than *Cardium laevigatum*; of a yellow colour, with the beaks regular.

EDULE. Shell antiquated, with about twenty-eight flattish ribs transversely striated with obsolete recurved imbrications.

This is our common cockle, a species found in the greatest plenty buried in the sands on all the arid shores of Europe. The animal inhabiting this shell has a peculiar flavour, and is esteemed as a wholesome and palatable food; the species varies in size and colour, they occur of a large size on some of the Scottish shores. Donovan. Brit. Shells.

ISLANDICUM. Shell fulcated, with about thirty-six smooth triangular ribs. Chemn.

Inhabits the North Seas, especially near the coasts of Iceland and Greenland; in its general aspect it resembles our common cockle, *cardium edule*, but the grooves are deeper and more numerous, and there are no striae except the outer margin; colour blackish, sometimes banded.

GREENLANDICUM. Shell glabrous, thin, mouse colour, with angulated ferruginous lines; margin glabrous with obsolete longitudinal lines. Chemn.

Same habitat as the former, about two inches and three quarters long, and three inches and a half broad; sometimes banded with brown.

RUSTICUM. Shell with twenty remote grooves, the intermediate spaces rugged. Inhabits European seas. Gmel. &c.

Obs. The specific name *rusticum* has been assigned to more than one or two different species of this genus; the *C. rusticum* of some English writers is probably only a variety of *C. edule*. Vide Donovan. Brit. Shells. *C. rusticum* of Chemn. may be distinct, but that is doubtful.

GLAUCUM. Shell subantiquated, anterior part glaucous; posterior part with twenty grooves imbricated upwards; beaks violet. Poiret.—Inhabits the shores of Barbary. A small species.

PECTINATUM. Shell somewhat heart-shaped, and pectinated. Linn.—Found in the Mediterranean sea. General colour white, with the cavity under the beaks yellow; valves marked with distant striae that are rough upwards; margins of the shells prominent.

VIRGINEUM. Shell triangular, rounded, equilateral, with transverse membranaceous recurved wrinkles; hinges blue. Gmel. &c. Inhabits the Mediterranean. A variety is found in the Indian and American seas.

STRILATERUM. Shell triangular, gibbous, and striated. Gmel. Inhabits the Caspian Sea. An indistinct species.

AURICULA. Shell heart-shaped, and slightly rhombiform with twenty-four ribs on each side; the grooves very finely crenulated; beaks distant.

Described by Forkal as a native of the Arabian seas; shell white and pellucid, two inches and a quarter long, and one inch and three quarters broad; margin of the back revolute and toothed.

TRISTE. Shell ovate and smooth; margins both of the anterior and posterior slope striated. Linn.

Native place unknown. Shell smooth, cinereous, and radiated with white; beaks reflected.

MONSTROSUM. Shell gibbous, one side impressed and ochraceous, the other convex heart-shaped, and whitish spotted with yellow; valves with dentated ridges. Chemn.—This is a very rare species; inhabits the Nicobar islands.

LIMA. Shell gibbous with aculeated ribs, the anterior ones with recurved membranaceous tubercles crenated at the sides; the intermediate grooves granulated. Chemn. Inhabits the Nicobar islands. This shell is ochraceous, with the anterior margin flesh-coloured, and the beaks reddish. A supposed variety of this species is described by Schroet, in which the ribs are more rounded, and instead of being aculeated or prickly are only granulated.

RINGENS. Shell rotundate, ventricose, and white, with deep teeth at the margin, the anterior ones rosy. Lister, &c. Inhabits the African and Mediterranean seas.

AEOLICUM. Shell thick, with longitudinal anterior striæ, and transverse striæ behind. Chemn. &c.—A native of Guinea, and the Antilles islands. Obs. This shell is very convex, and is varied with white and reddish.

OBLONGUM. Shell yellowish, oblong, turgid, and costated; anterior part glabrous, and cordiform with a crenated margin. Chemn.—Inhabits the Mediterranean. Length three inches, breadth two inches and a half; ribs about thirty. Much allied to the following species.

CRASSUM. Shell somewhat fuscous, rather oblong, thick, antiquated, with a very deeply dentated margin. Schroet, &c.—Resembles *Cardium oblongum*, but is much larger, rather broader, thicker, and has about twenty-three flattish ribs. Also inhabits the Mediterranean, and is found in the North Seas.

PAPYRACEUM. Shell pellucid, cinereous, with thin longitudinal striæ. Chemn.—This kind inhabits India; the shell is very brittle, within white, with purplish spots.

LATUM. Shell broad with unequal sides; ribs rather flat and spinulous. Chemn. &c.

Length two inches, breadth half an inch more; colour variable, being in some individuals white on the crown, yellowish in the middle, and edged with yellow; in others the crown is brown, and the rest of the shell banded with fuscous; inside white. Inhabits Tranquebar and Nicobar Islands.

MACULATUM. Shell spotted, with crowded undulated wrinkles; ribs broad; grooves very narrow, within pale rosy. List.—Found in the bay of Campechy. This shell is nearly three inches long, its breadth rather more, being three inches and three quarters.

FLEXUOSUM. Shell rotundate, fuscous with flexuous ribs, and rugose furrows.

Described by Lister; length one inch and three quarters, and about the same in breadth. Native place unknown.

GADITANUM. Shell rounded, yellowish-white, varied with red, green, and brown, and marked with decussated striæ. Bonan. &c. Found near Cadiz. Gmelin conceives this may be an *arca*.

BRASILIENSE. Shell rounded; ribs broad, flat, and very minutely crenated. Frequent on the Brazilian shores. Bonan. &c.

AMBOINENSE. Shell rather oblong, white with blackish spots: the ribs very convex.—Inhabits the Amboina shores. Bonan. &c.—Obs. This shell is about an inch and three quarters in length, with about twelve ribs.

SQUAMOSUM. Shell heart-shaped, equilateral, tawny white, and purplish within; ribs with imbricated scales. Gualt.—Resembles *Cardium fragum*, but wants the teeth at the anterior margin. Native place unknown.

RUBIGINOSUM. Shell reddish, with unequal sides, and convex ribs transversely striated. Gualt. Native place unknown.

VIRESCENS. Shell inequilateral, oblong, with very fine ribs doubled above. Gualt. Native place unknown.

FASCIATUM. Shell rounded, whitish, with a brown band; ribs acute. Knorr. Native place unknown.

CANCELLATUM. Shell reddish, thin, rounded, with decussating striæ. Gualt. Small. Native place unknown.

ALBIDUM. Shell inequilateral, ribbed, whitish, and purple within.

Obs. There are a few other of the larger species of *Cardium* described by conchological writers which we consider as ambiguous. These, with several of the more minute, and microscopic kinds, are purposely omitted in the above enumeration of species, as we are inclined to believe the insertion of such would rather tend to perplex than inform the general reader.

CARDONA, in *Geography*, a town of Spain, in Catalonia, seated on an eminence near the river Cardonero, with a strong castle, and the title of a duchy. In its vicinity are an inexhaustible mountain of salt of various colours, which, when washed, becomes white; and also vineyards, which produce excellent wine, and lofty pine-trees. N. lat. 41° 42'. E. long. 1° 26'.

CARDONERO, a river of Spain, which runs into the Llobregat, at Manxes, in the province of Catalonia.

CARDOON, in *Botany*. See *CYNARA Cardunculus*.

CARDS, *playing*, are little pieces of fine thin paste-board, of an oblong figure and of several sizes, but with us commonly $3\frac{1}{2}$ inches long, and $2\frac{1}{2}$ broad; on which are printed divers points and figures; a certain number or assemblage of which serve for the performance of various games: as ballet, ombre, picquet, whist, &c. A full pack consists of fifty-two cards.

A pack is always wrapped up in a piece of paper, on which are printed the name, sign, dwelling-place, &c. of the maker; with the label of the stamp-office of England, signifying that the stamp-duty has been paid.

Among sharpers, divers sorts of false or fraudulent cards have been contrived; as marked cards, brief cards, corner-bend, middle-bend, &c.

Marked cards, are those where the aces, kings, queens, and knaves, are marked on the corners of the backs with spots of different number and order, either with clear water, or water tinged with pale Indian Ink, that those in the secret may distinguish them. Aces are marked with single spots on two corners opposite diagonally; kings with two spots at the same corners; knaves with the same number, transversed, &c.

Brief cards, are those which are either longer or broader than the rest; chiefly used at whist and picquet.

The broad cards are usually for kings, queens, knaves, and aces; the long for the rest. Their design is to direct the cutting, to enable him in the secret to cut the cards disadvantageously to his adversary, and draw the person unacquainted with the fraud, to cut them favourably for the sharper. As the pack is placed either endways or sideways to him that is to cut, the long or broad cards naturally lead

him to cut to them. Brief cards are sometimes made thus by the manufacturer; but in defect of these, sharpers pare all but the breefs with a razor or pen-knife.

Corner bend, denotes four cards turned down finely at one corner, to serve as a signal to cut by.

Middle-bend, or *Kingston-bridge*, is where the tricks are bent two different ways, which causes an opening or arch in the middle, to direct likewise the cutting.

The inventor of cards is not known, nor even the age when they first appeared; but by the matter they were always made of, viz. leaves of paper, they should seem to be much posterior to the time of Charlemagne. The hon. Daines Barrington, Mr. Bowle, and Mr. Gough, in their three essays on the "Antiquity of Card-playing," (*Archæologia*, vol. viii.) seem to agree that the Spaniards have the best pretensions to be considered as the original inventors of this amusement. Others have traced their invention to about the year 1390, for the purpose of diverting Charles VI. then king of France, who was fallen into a melancholy disposition, and ascribe it to Jaquemin Gringonneur, a painter in Paris. Accordingly in the accounts of the treasurer of that prince the following article occurs; "Paid fifty six shillings of Paris to Jaquemin Gringonneur the painter, for three packs of cards, gilded with gold, and painted with diverse colours and diverse devices, to be carried to the king for his amusement." From this article it appears, that playing cards were originally very different in their appearance and their price from what they are at present. They were gilded, and the figures were painted or illuminated, which required no little skill and genius, as well as labour: and the price of each pack was no less than 18s. 8d. of Paris, a very considerable sum in those times. This last circumstance is one reason that playing cards were little known and used for several years after they were invented. By the four suits or colours, the inventor might design to represent the four states or classes of men in the kingdom. The *caurs* or hearts denote the *gens de chaur*, choir-men or ecclesiastics. The nobility or prime military part of the kingdom, is represented by the ends or points of lances or pikes, which through ignorance of the meaning of the figure, we have called spades. By diamonds are designed the order of citizens, merchants, and tradesmen. The trefoil leaf, or clover grass, corruptly called clubs, alludes to the husbandmen and peasants. The four kings are David, Alexander, Cæsar, and Charles; representing the four celebrated monarchies of the Jews, Greeks, Romans, and Franks under Charlemagne. The queens represent Argine (for Regina, queen by descent), Esther, Judith, and Pallas; which are typical of birth, piety, fortitude, and wisdom. The knaves denote the servants to the knights: others apprehend that the knights themselves were denoted by these cards, because Hogier and Lahire, two names of the French cards, were famous knights at the time when they were supposed to be invented.

The first certain notice of their having been known in England occurs in a record in the time of Edward IV. On an application of the card-makers of London to parliament, A.D. 1463, an act was made against the importation of playing-cards, 3 Edw. IV. c. 4. From this statute it appears, that both card-playing and card-making were known and practised in England before this period, or about 50 years after the æra of their supposed invention. Mr. Gough observes (*ubi supra*), that the use of cards among the Chinese is evident, not only from a Chinese painting which represents their ladies playing at a game with something much thicker in substance than cards, yet shaped and numbered like them, but also from a pack of Chinese cards in his pos-

session, made of the same materials as the European. However, the devices on these cards are very different from those known in this part of the world. Although card-playing was introduced at comparatively a late period in England, and the progress of it was at first slow, it hath since become sufficiently rapid and extensive, to the cost of many unfortunate gamblers, and the loss of many others, who spend too much of their time in that insatiable amusement. Lord Lyttelton in his Persian letters (apud Miscellaneous works, vol. i. p. 143), admirably rallies those who indulge their propensity for this kind of diversion to excess, and who risk sums of money which it is not convenient for them to lose; or, in other words, who pervert it to the purpose of gaming. Selim represents himself as visiting at a house in London, where he saw a number of tables in a room, round which were placed several sets of men and women. They seemed (says he) wonderfully intent upon some *bits of painted paper*, which they held in their hands. I imagined at first that they were performing some magical ceremony, and that the figures I saw traced on the bits of paper were a mystical talisman or charm. What more confirmed me in this belief was the grimaces and distortions of their countenances, much like those of our magicians in the act of conjuring; but inquiring of the gentleman who introduced me, I was told they were at *play*, and that *this* was the favourite diversion of both sexes. But, as he proceeds, I see no signs of mirth among them: if they are merry, why do not they laugh, or sing, or jump about? If I may judge of their hearts by their looks, half of these *revellers* are ready to hang themselves! that may be, said my friend; for very likely they are losing more than they are worth. How! said I, do you call that *play*? Yes, replied he, they never are thoroughly pleased unless their whole fortunes are at stake. Those *cards* you see them hold, are to decide whether he who is now a *man of quality* shall be a *beggar*; or another, who is now a *beggar*, and has but just enough to furnish out one night's play, shall be a *man of quality*, &c. &c.

The method of making playing cards seems to have given the first hint to the invention of printing; as appears from the first specimens of printing at Haerlem, and those in the Bodleian library.

CARDS, making of. The cutting of the moulds, or blocks, for these cards, is precisely the same as that used for the first books; and a sheet of wet or moist paper is laid on the form or block, which is first lightly brushed over with an ink, made of lamp-black mixed with starch and water; and then rubbed off with a round list, in the hand. The court-cards, they colour by help of several patterns, called "*stanefiles*;" consisting of papers cut through with a pen-knife: within the apertures, or incisions of which, the several colours, as red, &c. are severally applied (for at the first printing, the card has only a mere outline.) These patterns are painted with oil colours, to keep them from wearing out by the brushes: being laid on the paste-board, they slide a brush full of colour loose over the pattern; which leaving the colour within the apertures, forms the face or figure of the card.

This, very probably, was the way of the first printing at Haerlem; as might have been discovered long ago, if it had been considered, that the great letters in our old manuscripts of nine hundred years ago, are apparently done by the illuminers, after the method of card-making.

By 43 G. III. c. 63, a duty is imposed of 2l. 8s. on every dozen packs of playing cards imported: and for every pack of cards, made in Great Britain, the stamp duties by several acts amount to 2s. 6d., and for every pair of dice, 17s. 6d.

Places of making them are to be entered under a penalty of 50*l.*, and forfeiture of the cards, dice, materials, and utensils. Makers of cards shall send to the commissioners of the stamp-office a sufficient quantity of paper in order to have as many aces of spades impressed upon them as he shall desire; and a device, denoting the said ace of spades, shall be stamped on every pack used in Great Britain or intended for exportation, which device shall distinguish cards designed for home consumption from those intended for foreign consumption:—and wrappers inclosing cards for use in Great Britain shall have the name of the maker or any other particular word printed on them, according to the direction of the commissioners, who shall denote one of the 6*d.* duties charged on cards in Great Britain on each of such wrappers. Officers shall enter houses or places where cards and dice are made or sold, or suspected to be made, or any public gaming-house, to search and examine whether such cards are stamped; and the owner or occupier refusing such entrance or search shall forfeit 10*l.* No materials for cards or dice shall be removed till they are finished, on pain of double duty; nor shall any cards or dice be removed, till they are duly marked or sealed, on pain of forfeiting the same and treble value. Entry shall be made once in 28 days on oath, under a penalty of 20*l.*, and the duties shall be cleared off once in every six weeks, on pain of double duty. Selling or using unstamped cards or dice, incurs a forfeiture for every pack and for every one of such dice of 10*l.* with full costs. Altering the stamps subjects to a forfeiture of 20*l.* and the sale or purchase of such stamp incurs the same forfeiture. A person who takes off the stamp of any playing cards, or outside paper of any parcel or pack of cards, for the purpose of using it again, shall be guilty of felony, and transported for any time not exceeding seven years. The selling of waste cards, not previously rendered unfit for use in playing, incurs a forfeiture of 20*l.*; and any person who sells any cards, as second-hand cards, in packs or parcels, the wrapper of which has been broke open, unless every card be rendered unfit for play, forfeits 5*l.* for every such pack. If any person counterfeits the stamp on cards or dice, or the wrapper, or knowingly sells the same with a counterfeit stamp, or fraudulently uses any of the stamps provided by the commissioners, he shall be guilty of felony without benefit of clergy. No cards or dice shall be exported or exposed to sale without being stamped, until after the expiration of ten days after notice to the stamp-office by the maker of the quantity to be exported, and of the place to which they are intended to be conveyed, nor until a proper certificate be delivered to the custom-house officer at such post or place in Great Britain. Cards or dice may be removed by the maker without payment of the duties, provided the same be stamped for exportation, and a bond be given for exporting them within the time, and landing them at the port therein mentioned. Cards for exportation shall before packing be marked as the commissioners direct; and persons using or selling such cards, marked for exportation, in Great Britain, shall forfeit 20*l.* for every such pack: and any person relanding any parcel of cards, entered and shipped for exportation, shall forfeit 50*l.*; and if any person concerned shall inform against an-accomplice, he shall be admitted as evidence, and be indemnified.

CARDS, in *Manufacture*. See CARD.

CARDUCHI, in *Ancient Geography*, a stout warlike people of Asia, who were descended from the ancient Scythians, and divided into a great number of tribes. According to Strabo they were at a period subsequent to that of the famous retreat of Xenophon better known by the name of Parthians; a nation which became such a terror to

the Romans. M. De Lisle, in the explication of his map of Xenophon's retreat, alleges several arguments to prove, that they were the same with the present Curds, and that their country was the same which the Romans called Carduena, a large and mountainous territory on the east of the Tigris, and the moderns Curdistan; though it is probable, that the present tract which goes by that name is of much greater extent than that which the Carduchi then possessed, who only occupied the mountainous parts of it. Before the period of the retreat of the Greeks, they had defeated a Persian army of 120,000 men, none of which ever returned, the roads being impassable. Upon the approach of Xenophon's army they betook themselves to flight with their wives and children, and gave the Greeks a favourable opportunity for supplying themselves with plenty of provisions. Xenophon was much harassed by loose bands of these people, who discharged upon him and his rear-guard which he conducted, volleys of darts and stones. The Carduchi were much superior to the Greeks in the use and strength of their bows. We are told (Diod. Sic. lib. xiv. Xenophon, Anabaf. lib. iv.) that they were of such prodigious length, that they bent them with their feet; the arrows were in proportion, so well tempered and keen, and darted with such violence, that no shield could resist them; so that, by being able to throw them at such a distance, they kept themselves out of the reach of their enemies.

CARDUEL, or CARTHUEL, in *Geography*, a name given to the eastern part of Persian Georgia; the capital of which is Teflis.

CARDUELIS, in *Ornithology*, the name under which the common gold-finch is described by Gesner, Aldrovandus and others. See FRINGILLA *Carduelis*, Linn. *CARDUELIS Americana* of Briss. is the American gold-finch of English writers; FRINGILLA *tristis*, Gmel.

CARDUENA, in *Ancient Geography*. See CARDUCHI.

CARDUNCCELLUS, in *Botany*, Lob. ic. 2. p. 20. See CARTHAMUS *Carduncellus*.

CARDUNCULUS. See CYNARA.

CARDUUS, (a name given by the ancient Latin writers to several kinds of prickly plants, and particularly to the teasel, (*dipsacus fullonum*) formerly used in carding wool, as it still is in dressing cloth. The word is said to be derived from caro, (Gr. *καρνα*), a technical verb denoting the operation of cleansing wool from its impurities.) Thistle, Linn. gen. 925. Schreb. 1254. Willd. 1433. Juss. 173. Vent. vol. ii. p. 499. Gært. 932. Chardon, La Marek Encyc. Class and order, *syngenesia polygamia equalis*. Nat. ord. *capitata*, Linn. *Cinarocephala*, Juss.

Gen. Ch. *Cal.* common, swelling out in the middle, imbricated; scales numerous, lanceolate; terminated by a simple spine; in some species strong, in others weak. *Cor.* Florets all furnished with stamens and a pistil, uniform, tubular, funnel-shaped, nearly equal, reflected; tube very slender; border erect, five-cleft; segments linear, equal, one more deeply ferrated than the rest. *Stam.* Filaments five, capillary, short; anthers united, forming a hollow five-toothed cylinder. *Pist.* Germ egg-shaped; style thread-shaped, longer than the stamens; stigma simple, awl-shaped, naked, emarginate. *Peric.* none; except the permanent, somewhat converging, common calyx. *Seeds* solitary, inversely egg-shaped, a little four-cornered; down sessile, long, deciduous. *Recep.* hairy.

Ess. Ch. *Cal.* swelling out in the middle, imbricated; scales terminating in a simple spine. *Receptacle* hairy. *Down* deciduous.

This genus, like most of the others in the class syngenesia,

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is differently characterized by different authors. Some have divided the Linnæan genus into two: *carduus* including only those species which have a capillary down, and *cirsium* containing those whose down is feathery. Willdenow has united the latter with *cnicius*, and makes the essential difference between *carduus* and *cnicius* to depend entirely on the nature of the down. La Marck, on the other hand, has abolished the *cnicius* of Linnæus, which, he says, has a character too vague to be admitted; and has distributed its species between *carduus* and *carthamus*, observing, that some species of *carduus* in the *Species plantarum*, approach rather too near the character of *carthamus*. After a careful consideration of the subject, we are inclined to adopt his arrangement; and have constructed accordingly the generic and essential characters of *carduus* given above, adding from Gærtner, "down deciduous," which has the sanction of Dr. Smith; though we are not without apprehension, that this character may not be found in all the present acknowledged species.

Species. * *Leaves decurrent.*

1. *C. leucographus*, Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. Gært. tab. 162. fig. 1. Morif. Bleff. 744. (*Cirsium maculis argenteis notatum*, Tourn. Inst. 448.) "Leaves toothed-spinous; peduncles naked, very long, one-flowered; calyxes spinous, inclined." Root annual. Allion. Biennial. La Marck. Stem two or three feet high. Root-leaves scarcely petioled, growing close to the ground. Stem-leaves smooth, bright green, spotted with white, half-embracing the stem, and running down it so as to form three uninterrupted membranous wings, oblong-egg-shaped, pinnatifid nearly to the middle; lobes furnished with spines. Flowers purple, small; peduncles woolly and white, especially towards the summit, generally naked, but sometimes with a small leaf or two; spines of the calyx straight, not pungent. Down simple. A native of Italy and the south of France. 2. *C. peregrinus*, Willd. 2. Retz. Obs. 1. p. 27. (*C. lacteus peregrinus camerarii*, Rai. hist. 312.) "Leaves scolloped, spinous, downy underneath; peduncles generally naked, many-flowered; calyxes spinous, deciduous." Retz. Root annual. Stem three feet high, branched, striated, smooth; terminal branches downy. Leaves sessile, spotted with white above. Flowers red; florets few, scarcely longer than the scales of the common calyx; peduncles terminal and axillary; terminal ones branched, winged, long, from three to six-flowered; axillary ones short; scales of the calyx a little downy, deciduous, furnished with soft spines. Seeds small, white, besmeared with a whitish pellucid gum, which fastens the down so strongly to them, that it cannot easily be separated; down capillary. A native of Spain. Ray. 3. *C. lanceolatus*, Linn. Sp. Pl. 2. Mart. 2. Lam. 2. Eng. bot. 107. (*Cnicus lanceolatus*, Willd. 10.) Spear thistle. "Leaves pinnatifid, hispid; segments divaricated; calyx villous; stem hairy." Root biennial, branched. Stem three or four feet high, erect, strong, branched, furrowed, many-flowered. Leaves alternate, woolly underneath; lobes pinnatifid, or palmate at the base; segments alternately divaricated, mucronate-spinous; spines yellow, shining. Flowers terminal, erect, large; calyx egg-shaped; scales acutely spinous, ascending, clothed, like the under surface of the leaves, with a white, cotton-like web; florets uniform, purple; anthers yellow. Seeds inversely egg-shaped, shining; down feathery. Dr. Smith. A native of waste places and road sides throughout Europe, flowering from June till winter. 4. *C. nutans*, musk thistle. Linn. Sp. Pl. 3. Mart. 4. Lam. 3. Willd. 6. Eng. bot. 107. "Leaves interruptedly decurrent, spinous; flowers drooping; scales of the calyx lanceolate; their upper part spread-

ing." Root annual, (biennial, Lam.) spindle-shaped. Stem two or three feet high, erect, a little branched, striated, smoothish. Leaves deeply scolloped and waved, very spinous, green on both sides, a little hairy, but not rough. Flowers terminal, solitary, peduncled, of a rich crimson colour, smelling strongly of musk in warm weather; peduncles woolly; calyx egg-shaped; scales lanceolate, acutely spinous, somewhat woolly; the outer ones spreading, the inner ones more close. Seeds shining, compressed, marked with dotted streaks; down rough, but not feathery. Dr. Smith. A native of a calcareous soil in many parts of Europe, flowering in June. The dried leaves of this and the preceding species are sometimes used to curdle milk. 5. *C. macrocephalus*, Willd. 5. Desf. atl. 2. p. 245. "Stem downy; leaves interruptedly decurrent; flowers drooping; calyx-scales egg-lanceolate, woolly, their upper part spreading." Allied to the preceding, but differs in having a downy stem, and flowers two or three times larger. A native of Tunis, flowering early in the spring. 6. *C. lanuginosus*, Willd. 4. (*C. orientalis acanthi folio candidissimo*, Tourn. Cor. p. 31.) "Leaves decurrent, lanceolate, pinnatifid, toothed, spinous, snowy white with down on both sides; flowers terminal, solitary, sessile." Whole plant covered with a dense, white down. Stem toothed, with spines on the decurrent leaves. Leaves with three or four spinous teeth on the upper segments. Flowers purple, a little less than those of *C. nutans*, erect; calyx-scales lanceolate, not spreading. A native of Armenia. 7. *C. crispus*, curled thistle. Linn. S. Pl. 5. Mart. 6. Lam. 5? Willd. 3. "Leaves decurrent, spinous at the margin; flowers aggregate, terminal, with soft spines. Linn. Calyx-scales linear-awl-shaped, mucronate, spreading." Willd. Leaves downy, white, with green veins. Peduncles downy: scales of the calyx recurved, but not pungent. Linn. There is much confusion in authors with respect to the plant intended by Linnæus. La Marck says that the flowers of his *crispus* are not aggregate. 8. *C. polyanthemus*, Linn. Mant. 109. Mart. 7. Willd. 15. (*C. pycnocephalus palustris*, Triumf. obs. tab. 103. *Cirsium palustre polianthemum*, Vail. act. 160.) "Leaves scolloped, ciliated, naked underneath; flowers peduncled, clustered." Very like *C. crispus*, but differs from it in having neither the petioles nor the under surface of the leaves downy. Stem taller than that of *C. crispus*. Leaves deeply runcinate, not rigid, rather obtuse, ciliated with soft spines, marked with hollow veins, paler beneath, but not white; upper stem-leaves lanceolate, irregularly scolloped, entirely decurrent, curled, scarcely pungent. Flowers purple, nearly sessile, three or four together at the top of the stem; peduncles curved, not hairy; anthers violet; styles white; stigmas purple. Down capillary. A native of Rome. Linn. 9. *C. acanthoides*, welshed thistle. Linn. Sp. Pl. 4. Mart. 5. Willd. 9. Eng. bot. 973. (*C. crispus*, Hudf. Lightf. *C. polyacanthos*, Curt. Lond. Sibth. *C. inclinans*, With. 2d. ed. Mart. 39.) "Leaves decurrent, scolloped, spinous; calyxes globular, generally peduncled; scales recurved. Root annual, spindle-shaped, white. Whole plant green. Stem three feet high or more, erect, branched, furrowed, but little hairy; branches elongated, spreading. Leaves rather interruptedly decurrent, smaller than in *C. nutans*, green on both sides, smoothish. Flowers terminal, a little inclining, deep purple, odorous; calyx globular; scales linear, recurved at the tip, slightly spinous, a little woolly; florets deeply divided nearly to the base so as to appear two-lipped; the upper lip four-cleft, the lower simple. Down deciduous; capillary, rough. Linn. and Dr. Smith. We have observed, beneath the divisions of the segments,

five depressions resembling nectareous glands. A native of ditch banks and hedges, flowering in June and July. 10. *C. nigrescens*, Lam. 16. "Leaves decurrent, narrow, scolloped-toothed, spinous, curled; flower large, terminal." Stem simple, scarcely a foot high, a little downy, sometimes two-flowered. Leaves dark green, beset here and there with a woolly down. Flower purple; calyx-scales bristle-shaped, rather loose, not pungent. Lam. Described from a dried specimen. Observed by Villars on the Alps about Grenoble. 10. *C. lamulosus*, Willd. 10. Ehr. Beitr. p. 166. "Leaves decurrent, lanceolate, pinnatifid-toothed, spinous, villous underneath; peduncles one-flowered, downy; calyx-scales awl-shaped, spinous; inner one recurved." Root biennial. Stem four or five feet high, much branched, erect. Flowers purple, drooping; calyx roundish. A native of Hungary. 12. *C. candicans*, Willd. 2. Waldb. and Kitaib. Pl. Rar. Hung. i. p. 85. tab. 83. "Leaves semi-decurrent, lanceolate, pinnatifid, spinous, downy beneath; peduncles feely, downy; calyx egg-shaped; scales awl-shaped, straight." Root biennial. Stem smooth below. Flowers purple, less than those of *C. crispus*; calyx smooth. A native of Hungary. 13. *C. paniculatus*, Willd. 16. Mart. 46. Vahl. Symb. i. p. 68. Ait. Kew. iii. p. 143. "Leaves semi-decurrent, tooth-scolloped, spinous, smooth; flowers panicled." Root perennial. Stem two feet high, erect, purplish, furrowed, angular, smooth, spinous. Leaves lanceolate; spines rigid, yellowish. Flowers, towards the summit, numerous, on woolly peduncles; below solitary, or growing two or three together, nearly sessile; calyx egg-shaped; scales smooth, terminated by a small yellowish spine. Down capillary. Vahl's plant is a native of the Pyrenées. The Kew plant was brought from the south of Europe, and introduced in 1781, by Monf. Thouin. The stem-leaves are said to be unequally ciliated; the lower ones lyre-shaped and waved, but there appears little doubt of its identity with that of Vahl. 14. *C. palustris*, Linn. Sp. Pl. 6. Mart. 8. Lam. 6. Curt. Lond. Fasc. 6. tab. 56. Eng. Bot. 974. (*Cnicus palustris*, Willd. 1.) "Leaves decurrent, pinnatifid-toothed, spinous, rough; calyx egg-shaped, aggregate, with very small spines." Root biennial, branched. Stem from three to six feet high, erect, stiff, angular, often branched; branches spreading. Leaves interruptedly decurrent, deep green. Flowers purple or white, terminal, often sessile; calyx-scales lanceolate, keeled, pressed close, scarcely woolly. Seeds very smooth, not striated; down deciduous, feathery. Dr. Smith. A native of wet situations in England, and many other parts of Europe, flowering in July and August. 15. *C. pungens*, (*Cnicus*, Willd. 2. *Cirsium orientale*, acanthi folio, Tourn. Cor. 32.) "Leaves decurrent, woolly underneath, pinnatifid, spinous; flowers in close racemes; calyx-scales egg-shaped, spinous; spines spreading." Stem erect, branched, furrowed; spines strong, yellowish, half an inch long. Flowers the size of those of *C. palustris*; calyx-scales pressed close, terminated by a rigid, spreading, yellowish spine; down feathery. Similar in the inflorescence and general habit to *C. palustris*, and in the shape of the leaves to *C. lanceolatus*. A native of Armenia. 16. *C. arenarius*, Desf. Atl. ii. p. 247. tab. 222. (*Cnicus*, Willd. 3.) "Leaves decurrent, woolly, lanceolate, toothed, curled, spinous at the edge; flowers in close racemes; calyx-scales lanceolate awl-shaped, pungent, reflexed." Stem a foot and a half, or two feet high; erect, simple, downy. Leaves unequally pinnatifid-toothed, with a white, woolly rib. Flowers pale violet, five or six at the top of the stem, nearly sessile; calyx egg-shaped, the size of that of *C. lanceolatus*; scales closely imbricated at the base, woolly. Seeds four-cornered, smooth; down sessile, white, feathered.

Desf. l. c. A native of Barbary near Sfax. 17. *C. pycnocephalus*, Linn. Sp. Pl. 7. Mart. 9. Lam. 7. Willd. 17. Jacq. Hort. tab. 47. "Leaves decurrent, pinnatifid-scolloped, pubescent, spinous; peduncles without leaves, downy; calyxes deciduous." Root perennial. Stem from one to three feet high, white, with hairs. Root-leaves somewhat lanceolate, a little scolloped; stem-leaves oblong, toothed, pubescent on both sides, whiter, and almost woolly underneath. Flowers purple; peduncles short, white with down, neither winged nor spinous; pedicels with three or four flowers; calyxes about the size of a hazel nut, oblong; scales awl shaped, erect, spreading, with small spines; florets often nine or ten; border erect. Linn. 18. *C. australis*, Linn. jun. Supp. 348. "Leaves decurrent, runcinate, spinous; calyxes nearly sessile, terminal." *C. Arabicus*, Willd. 3. Jacq. Ic. 1. tab. 165. Collect. i. p. 56. "Leaves decurrent, oblong, scolloped, spinous, white-veined, villous underneath; flowers sessile, rather clustered; calyxes cylindrical." Willd. *C. galactites*, Lam. 21. "Stem winged, branched; upper wings broader; leaves decurrent, angularly toothed, spinous, downy underneath; flowers sessile, axillary and terminal." La Marck. We have transcribed the specific character given by each of the three authors, because the identity of the plants has not been absolutely ascertained, though it seems highly probable. Professor Martyn, however, considers the arabicus and the australis as distinct species, n. 3, and 11. Stem about a foot high, woolly or cottony. Leaves alternate, remote, sessile, scarcely decurrent all the way from one to another, oblong, somewhat scolloped at the sides, a little cobwebbed, the lateral veins running out into white spines. Linn. jun. Oblong, scolloped in a pinnatifid manner, toothed, spinous, attenuated at the base, smoothish, and white-veined above, woolly-villous underneath; the root and lower stem ones petioled, the rest decurrent. Willd. Decurrent, almost petioled, angular, toothed, spinous, green above, whitish and cottony underneath. Lam. The white veins are not mentioned by La Marck; but his specific name implies them. Flowers terminal and lateral, terminal ones several, lateral ones solitary, sessile. Linn. Willd. Lam. Calyx-scales lanceolate-egg-shaped, pressed close. Willd. Somewhat spreading. Linn. A native of the south of Europe. Linn. Lam. Arabia? Willd. 19. *C. tenuiflorus*, Willd. 14. Mart. 51. Curt. Flor. Lond. Fasc. 6. tab. 55. Eng. Bot. 412. (*C. acanthoides*, Lam. 4. Hudf. 351. Lightf. 451. With. Ed. ii. 871.) "Leaves decurrent, scolloped, spinous, downy; calyxes somewhat cylindrical, aggregate, sessile; scales lanceolate, rather erect." Root annual, spindle-shaped, small. Whole plant white, with down. Stem four feet high, erect, stiff, but little branched, furrowed. Leaves scolloped, most woolly underneath, broadly decurrent. Flowers pale purple, terminal, clustered, sessile; calyx slender, pale, scarcely woolly; scales lanceolate, even, smooth, rather erect, but little nerved, acutely spinous; florets from ten to fifteen; down deciduous, capillary, rough. There was long much controversy among British botanists concerning this thistle; the herbarium of Linnæus at length determined that it has not been inserted among his works. Dr. Smith was for some time inclined to consider *C. pycnocephalus*, *australis*, and the plant before us, as only varieties of the same species. He observes, however, that the two former have fewer scales in their calyx, the stalk less winged, and their flowers, whether sessile or pedunculated, are much fewer together, with less numerous florets. See Eng. Bot. La Marck's *acanthoides* is clearly the present plant, and he speaks of it as very common in uncultivated ground, dry ditches, and under the shelter of walls in France and other parts of Europe.

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Europe. In Great Britain it appears to be very local, though abundant where it has once gained a footing. It is common about London, growing, as Curtis observes, in the very suburbs. We have observed it about the skirts of Edinburgh and Sunderland, and should have supposed it confined to the neighbourhood of populous towns, if we had not found it in great plenty at Blackpool in Lancashire, about the dry banks, which are the only fences of the inclosed land in that naked part of the country. 20. *C. argentatus*, Linn. Mant. 280. Mart. 10. Lam. 8. Willd. 18. Jacq. hort. tab. 192. (*Cirsium ægyptiacum minus*, foliis ad limbum argenteis.) "Leaves decurrent, mucronate, spinous; peduncles somewhat downy, one-flowered; calyxes egg-shaped, mucronate, not pungent." Root annual. Stem a foot high, zig-zag, smooth, alternately branched. Leaves small, oblong, green, spotted with white, especially about the indentures. Flowers small, purple, scarcely opening, terminal; peduncles very long, one-flowered, downy, erect; calyx falling off entire with the ripe seeds; scales closely imbricated, erect; down capillary. Linn. and Lam. A native of Egypt. 21. *C. cyanoides*, Linn. Sp. Pl. 9. Mart. 13. Lam. 9. Willd. 19, 20. *α. monoclonos*, Gmel. sib. 2. p. 42. tab. 15. *β. polyclonos*, tab. 16. "Leaves decurrent, pinnatifid, linear, entire, without spines, petioled, downy underneath." Root perennial. Stem in *α.* nearly simple, with few leaves; in *β.* much branched, the upper leaves much dilated at the base, the lower ones with linear pinnæ. Down capillary. Willdenow makes them distinct species. A native of Tartary. 22. *C. canus*, Linn. Mant. 108. Mart. 14. La Marck 10. (*Carduus tuberosus*, Jacq. Vind. 280. from the description. Aust. 1. tab. 42, 43. *Cnicus canus*, Willd. 4. *Cirsium tomentosum radice bulbosa*. Bauh. hist. 3. p. 44. *C. montanum maximum*, Rai. hist. p. 305.) "Leaves decurrent, lanceolate, toothed, a little cobwebbed, with hairs on both sides." Roots perennial, spindle-shaped, aggregate, fleshy, white. Stem four feet high, green, angular, cobwebbed. Leaves somewhat scolloped, toothed; fringed with white, scarcely pungent spines; keeled. Flowers solitary, purple, terminal; peduncles long, with a few small floral leaves; calyx not pungent, marked with a white line on the outside. Linn. Down feathery. A native of Austria. 23. *C. pectinatus*, Linn. Mant. 279. Mart. 15. Lam. 11. Willd. 21. "Leaves decurrent, lanceolate, pinnatifid-pectinate; peduncles very long; flowers drooping as the seed ripens." Root biennial. Whole plant smooth. Stem two feet high, erect. Leaves with a pale keel, deeply toothed, so as to resemble a comb; teeth equal, lanceolate, large, entire, but slightly ciliated; ending in a soft spine, and furnished at their base with a small deflexed tooth. Flowers purple, the size of the common burdock, terminal; peduncles very long, one-flowered, somewhat downy; calyx-scales linear, spreading; anthers white; pistil long. Linn. Raised by Linnæus from seeds brought among other kinds from Pennsylvania. 24. *C. alpestris*, Willd. 23. Waldf. and Kit. pl. rar. Hung. "Leaves semi-decurrent, pinnatifid, acuminate; segments two-lobed, ciliate-spinous; peduncles downy; calyx-scales linear-awl-shaped, spreading." Stem a foot, or a foot and half high, simple. Leaves green on both sides. Flowers purple, two or three at the top of the stem; peduncles leafless, downy. Seed-down capillary, rough. A native of the Croatian Alps. 25. *C. defloratus*, Linn. Sp. Pl. 21. Mart. 16. Lam. 12. Willd. 24. Jacq. Aust. tab. 89. Hall. helv. 677. tab. 18. fig. 2. "Leaves decurrent, lanceolate, ferrated, somewhat ciliated with spines, smooth; peduncles very long, woolly, one-flowered." Root perennial. Whole plant smooth. Stem sometimes simple, only a foot high, one-flowered; sometimes

branched, a foot and half high. Leaves dark green; peduncles leafless, a little cottony towards the summit. Flowers purple, often drooping as the seeds ripen. Down capillary. A native of Austria, Switzerland, and the southern provinces of France. 26. *C. feminudus*, Willd. 25. "Leaves semi-decurrent, ferrated, spinous, grey underneath; peduncles very long, one-flowered, woolly." Similar to the preceding, but its leaves are shorter, grey underneath, and less deeply ferrated; the calyx-scales spreading. A native of the northern parts of Persia. 27. *C. medius*, Lam. 13. Gouan. Illust. 62. tab. 24. Mart. 43. excluding the reference to Allioni pedem. (*Cnicus Gouani*, Willd. 6.) "Leaves decurrent, pinnatifid, spinous at their edges; stem one-flowered; calyx-scales without spines, spreading, bristle-shaped." Similar to *C. defloratus*, but its leaves are villous underneath, larger and more divided. Root perennial. Stem a foot and half high, simple. A native of the Pyrenées. 28. *C. carlinifolius*, Lam. 14. Willd. 8. Vahl. Symb. i. p. 67. "Leaves decurrent, smooth on both sides, pinnatifid; pinnæ angularly cut, spinous; peduncles one-flowered, woolly under the flower." Lam. Stem a foot and half high, erect, branched, smooth, spinous, woolly near the summit. Leaves resembling those of the preceding species in shape, but smooth on both sides; spines strong, yellowish. Flowers purple, seldom more than three; calyx-scales lanceolate-awl-shaped, spreading, rather pungent. Vahl. A native of the south of France. 29. *C. carlinoides*, Mart. 42. Willd. 7. Gouan. Illust. 62. tab. 23. (*Carlina pyrenaica*, Linn.? *Carduus tomentosus pyrenaicus*, Tourn. Inst. 441.) "Leaves decurrent, pinnatifid, downy; segments palmate, spinous; flowers clustered." Vahl. Root perennial. Stem a foot high, or more, white with down, sometimes panicle-branched; branches axillary, alternate, solitary. Root-leaves three or four inches long, somewhat lanceolate, petioled, very woolly; pinnules on each side from twelve to fifteen, imbricated, three or five-cleft, the lobes alternately smaller, ending in a strong yellow spine. Stem-leaves crowded, very like those of the root, but as they approach the top of the stem the pinnules are narrower and less palmated. Flowers purple, from four to eight; peduncles short, woolly; calyx in flowering time very smooth, green, acuminate-egg-shaped; scales loosely imbricated, but not squarrose, nearly equal, a little pungent; the inner ones sometimes violet-purple, more slender, flexible and soft. Gouan. A native of the Pyrenées, and of the Alps about Col Tende. La Marck believes it to be the *carlina pyrenaica* of Linnæus. 30. *C. argemone*, Lam. 15. "Leaves decurrent, broadly egg-shaped, twice pinnatifid, ciliated, smooth on both sides; peduncle terminal, one-flowered." Lam. Stem about a foot high, simple, smooth. Leaves ciliated, with very small spines. Calyx smooth; scales close, not pungent. Described from a single specimen in the herbarium of Thouin, brought from the Pyrenées by abbé Pourret. 31. *C. monspessulanus*, Linn. Sp. Pl. 10. Lam. 17. Mart. 17. Gouan. Monsp. 422. (*Cnicus Monsp.* Willd. 9. *Cirsium foliis non-hirsutis, floribus compactis*, Bauh. pin. 377.) "Leaves decurrent, lanceolate, somewhat repand, or angularly scolloped, smooth, unequally ciliated; peduncles alternate; calyxes not pungent." Linn. Root perennial. Stem four feet high, channelled, a little branched, greenish below, slightly cottony towards the summit. Leaves almost entire, a little glaucous, the lower ones entirely decurrent, middle ones semi-decurrent, upper ones sessile. Flowers purple, remarkably small for the size of the plant; calyx-scales small, expanding at the points. Down feathery. A native of the south of France. 32. *C. pyrenaicus*, Lam. 18. Mart. 45. Jacq. obs. 4. p. 11. tab. 95. Gouan. illust. 63. (*Cirsium pyrenaicum*, cum

cum altissimum, Tourn. Inst. 448. *Cnicus pyrenaicus*, Willd. 5.) "Leaves decurrent, lanceolate, a little repand, downy underneath, ciliate-spinous; flowers clustered." Lam. Perhaps only a variety of the preceding: it is, however, larger, and constantly distinguished by its leaves being cottony and whitish underneath, by the long, yellowish-white, pungent spines with which the leaves are ciliated, and by its clustered flowers at the top of the stem. The root-leaves are more than a foot long, narrowing into a petiole. Lam. A native of the Pyrenées. We are in doubt whether the pyrenaicus of professor Martyn be the same plant. His only synonyms are Jacq. obs. 4. 11. Gr. Prov. 179. n. 13. and Allion. pedem. n. 549. tab. 12. neither of which are quoted either by La Marck or Willdenow. His specific character accords sufficiently with La Marck's, except in describing the leaves as downy on both sides; but his larger description taken from Allioni does not seem to be consistent with it. It is as follows. Stem three feet high, or more, striated, green, smooth. Leaves alternately sessile, and decurrent with ears; almost winged, or very deeply gashed, with few teeth, ending in a longer spine; the whole edge ciliate with short spines. Flowers at the top, three or four, with a small leaf under each; peduncles cobwebbed. Top of the stem almost naked; calyx-scales not pungent, linear, reflected at the end. This description agrees better with *C. pratensis* of La Marck, which is certainly not the *pratensis* of the English botanists; but there are some differences, as will appear from the following description. 33. *C. ambiguus*, (*C. pratensis*, Lam. 23. *C. pratensis* asphodeli radice, foliis profunde et tenuiter laciniatis, Bauh. pin. 377.) "Leaves semi-decurrent, pinnatifid-lacinate, ciliated, smooth on both sides; flowers generally solitary, peduncled." Root perennial. Stem three or four feet high, striated, a little branched. Leaves smooth, and green on both sides; spines not pungent; root leaves long, pinnatifid; pinnules cut into deep segments; lower stem leaves cut in the same manner, and at least semi-decurrent; upper ones smaller, less divided, less decurrent, many of them sessile. Flowers purple, resembling those of *C. monspeliensis*. A native of the south of France, described by La Marck from a living plant. La Marck observes that it may possibly be *C. tuberosus* of Linnæus, but not all his synonyms. 34. *C. chiensis*, Mart. 20. Jacq. hort. 3. tab. 5. "Lower leaves semi-decurrent, semi-pinnatifid, ciliate-spinulous; upper ones embracing the stem or sessile; stem not spinous; peduncles one-flowered." Nearly allied to the preceding, if it be more than a variety. Stems five or six feet high, branched from top to bottom, angular, villous, erect. Leaves lanceolate-oblong; the upper surface almost smooth, and deep green; the lower somewhat villous, and paler, but no where woolly; acuminate and pinnatifid; segments lanceolate, ciliate-spinous, scarcely pungent; root-leaves a foot and half long. Flowers purplish flesh-colour, erect; peduncles terminal on each branch, one-flowered, near the flower a little woolly, and ash-coloured; calyx egg-shaped, not hirsute; scales with an oblong, glutinous bump on the back, ending in a short, soft, dark purple spine. Seeds shining; down feathery. A native of Chios, received by Jacquin about the year 1770, from Marfigli of Padua. 35. *C. creticus*, Lam. 20. (*Cirsium creticum* altissimum, *C. lanceolati-folio*, Tourn. Cor. 32.) "Leaves decurrent, pinnatifid, smooth underneath; segments divaricated, spinous; flowers small, clustered; calyx scales small, somewhat spinous." Stem a little branched near the summit, spinous, striated, almost smooth. Leaves resembling those of *C. lanceolatus*, but narrower. Flowers purple; calyx globular. A native of the Isle of Candia, described by La Marck from a dried specimen in the herba-

rium of Jussieu. 36. *C. pannonicus*, Linn. jun. Supp. 348. Mart. 18. Lam. 22. Willd. 26. (*C. serratuloides*; Jacq. auct. v. 3. tab. 5. *Cirsium angustifolium non laciniatum*; Bauh. pin. 377.) "Leaves semi-decurrent, naked, undivided, ciliated; flower often solitary." Root perennial. A native of Hungary and Austria. 37. *C. parviflorus*, Linn. Mart. 279. Mart. 21. Lam. 23. Willd. 27. (*Cirsium pratense alpinum polycephalum*, asphodeli radice; Tourn. Inst. 448.) "Leaves adnate at the base, scarcely decurrent, lanceolate, naked, irregularly scolloped, ciliated with weak spines." Root perennial. Stem upright. Leaves green on both sides. Flowers white, terminal, peduncled, the size of those of *Serratula tinctoria*; calyx egg-shaped; scales with a white keel, ending in a soft spine; styles long. A native of mountains in the south of Europe.

* * * Leaves not decurrent.

38. *C. Casabona*, Linn. Sp. Pl. 12. Mart. 23. Lam. 24. (*Cnicus casabonæ*; Willd. 42. *Acarna major*, caule non folioso; Bauh. pin. 379. *Acarna Theophrasti anguillare*; Lob. ic. 2. Barrel. ic. 1221.) "Leaves sessile, narrow-lanceolate, perfectly entire, flat; downy underneath, armed with triple spines on the edge; flowers axillary, sessile, in a kind of spike; calyx-scales lanceolate, spinous, spreading." Root biennial. Stem two or three feet high (six, Mart.) perfectly simple, upright, channelled, whitish or reddish, thick set with leaves in its whole length. Leaves acute, smooth, bright green above, very white or saffron-coloured underneath; spines very sharp, yellowish. Flowers purple. A native of the south of France and Italy. The trivial name is derived from Casabona, herbarist to the grand duke of Tuscany, who sent the seeds to J. Bauhin. 39. *C. afer*, Jacq. hort. Schoerb. 2. tab. 145. (*Cnicus afer*; Willd. 3.) 3. *C. diacantha*, Mart. 48. Billard. ic. pl. Syr. 2. p. 7. tab. 3. "Leaves sessile, lanceolate, downy underneath, somewhat scolloped, lobes emarginate, armed with double spines; flowers peduncled, in a kind of corymb; calyx-scales lanceolate, spinous, remarkably spreading." The separation of the indentures is more angular in α than in β , but there is no other difference, Willd. Root annual. Stem two feet high, straight, simple, striated, downy. Leaves smooth above, but the nerves are white with down; spines at the edge sometimes, but rarely, ternate or solitary, unequal, diverging, yellow; the end one single. Flowers few, violet; peduncles single, striated, downy, sometimes furnished with one or two leaves; calyx egg-shaped; scales lanceolate-egg-shaped, pubescent, ending in a long, awl-shaped, rigid, sharp dagger-point, the lower ones reflexed; segments of the florets awl-shaped, upright, unequal; stigma jointed, awl-shaped, seldom bifid. Seeds inversely egg-shaped, very smooth, brown; down whitish, feathery, Billardiere; α is a native of Barbary; β , of Syria. 40. *C. hispanicus*, Lam. 25. (*Carduus polyacanthos hispanicus*; Tourn. Inst. 441. Barr. ic. 474.) "Leaves sessile, lanceolate, waved, downy underneath, furnished at the edge with very long spines not proceeding from the same point; flowers in a kind of corymb." Root perennial, long, woody, bearing on its crown the remains of former leaves which give it a scaly appearance. Stem not more than twelve or fifteen inches high, simple, thick, somewhat woody, striated, whitish and cottony, thick-set with leaves. Leaves very smooth above. Flowers large; peduncles about an inch long; calyx formidably spinous. A native of Spain. 41. *C. gnaphaloides*, Mart. 50. Cyrill. rar. neap. 1. 27. tab. 9. "Leaves sessile, in a sort of whorl, quite entire, downy underneath." Root perennial, woolly, springing from the clefts of rocks whence the plant hangs. Stems one or two feet high, much branched, white, with a close nap, clothed with leaves from top to bottom.

bottom. *Leaves* lanceolate-linear, two or three inches long, green and smooth above, except at the base, a little rolled back on the sides; those of the former year remaining withered and dry at the bottom of the stem. *Flowers* purple, terminal; calyx egg-shaped, contracted at the top, glaucous green; scales simple, stiffish, acute but not pungent; anthers purple, each terminating at the bottom in two cirrhi; filaments very hairy at the top. *Seeds* egg-shaped, grey; down very long. A native of the Upper Calabria, gathered in 1783 by Angelo Fufani. Before that it was known to exist only in the Herbarium of Ferrantes Imperati, under the name of *Jacea*. 42. *C. stellatus*, Linn. Sp. Pl. 13. Mart. 24. Lam. 26. *Foliis integris, flore purpureo*, Tourq. 440. (*Cnicus stellatus*, Willd. 44.) "Leaves sessile, linear-lanceolate, entire, not pungent, downy underneath; axillary spines in pairs, somewhat branched; flowers sessile, lateral, and terminal." In habit resembling *Centaurea calcitrapa*. *Root* annual. *Stem* a foot high, much branched, a little cottony. *Leaves* three inches long, green above, very narrow at the base. *Flowers* purple, solitary; peduncles with two or three floral leaves; calyx-scales long, sharp, pungent. A native of Sicily and the county of Nice. 43. *C. dentatus*. (*Cnicus dentatus*, Willd. 41.) "Leaves embracing the stem, lanceolate, doubly toothed, spinous, woolly underneath; stem one-flowered; calyx-scales lanceolate-egg shaped, mucronate, pressed close." *Stem* half a foot high or more, simple, erect, furrowed; especially near the flower. *Leaves* on the stem generally four; lower ones somewhat petioled; upper ones embracing the stem, narrowed at the base. Described by Willdenow from a dried specimen. Native country unknown. 44. *C. virginianus*, Linn. Sp. Pl. 18. Mart. 29. Lam. 40. Willd. 30. Gron. Virg. 117. Jacq. Obs. 4. p. 13. tab. 99. (*Cirsium minus virginianum*, Moris. Hist. 3. p. 150. Rai Sup. 197.) "Leaves sessile, lanceolate, edged with spinous teeth, downy underneath; stem leafy, one-flowered; calyx not pungent." Linn. "Calyx-scales mucronate." Willd. *Stem* slender, a foot or eighteen inches high, furnished with 26 or 28 leaves, which diminish in size from the bottom to the top. *Flower* purple. A native of Virginia. 45. *C. linearis*, Mart. 22. Willd. 35. Thunb. Jap. 305. "Leaves sessile, linear, ciliate-spinous, smooth; flowers terminal, solitary." *Stem* a foot high, herbaceous, erect, round, striated, not spinous; branches alternate, spreading, a little downy near the top. *Leaves* two inches long, spreading. *Flowers* small; calyx a little downy at the base. A native of Japan. 46. *C. giganteus*, Desf. Atl. 2. p. 245. tab. 221. *C. scaber*, Poir. Itin. 2. p. 201. (*Cnicus giganteus*, Willd. 19.) "Leaves embracing the stem, egg-shaped, scolloped, beset with bristly hairs, downy underneath; lobes spinous; peduncles about three-flowered; calyxes globular; scales egg-lanceolate, spinous, pressed close. A native of Algiers. 47. *C. lanatus*. (*Cnicus lanatus*, Willd. 21.) "Leaves sessile, lanceolate, scolloped, smooth, downy underneath, spinous at the edges; calyxes oblong; scales egg-shaped, mucronate, recurved." *Stem* erect, striated, smooth, branched. *Leaves* two inches long. *Peduncles* naked, one-flowered, pubescent. Similar in habit to *C. arvensis*. A native of the East Indies, communicated to Willdenow by Dr. Roxburgh. 48. *C. syriacus*, Linn. Sp. Pl. 15. Mart. 26. Lam. 27. (*C. maculis albis exoticus*, Bauh. pin. 381. *C. latifolius echinos obsoletæ purpuræ ferens*, Bauh. pin. 380. *C. lacteus syriacus*, Cam. Hort. 35. tab. 10. *Cnicus syriacus*, Willd. 45.) "Leaves embracing the stem, oblong, toothed, spinous, white-veined; flowers nearly sessile, bracteated; calyx-scales oblong-lanceolate, pressed close, mucronate." Willd. *Root* annual. *Stem* two or three feet high, erect, simple, almost smooth. *Leaves* angularly scolloped, green, spotted with white; lower ones

narrowed into a petiole. *Flowers* white, sometimes purple, solitary, lateral, and terminal; bractes four or five, with strong white nerves, ending in a spine; down feathery. A native of Syria, Capdia, and Spain. 49. *C. flavesceus*, Linn. Sp. Pl. 24. Mart. 35. Lam. 48. Cavan. Hist. ic. 1. p. 35. n. 52. tab. 46. Krock. Siles. n. 1346. (*Cnicus flavesceus*, Willd. 46.) "Leaves lanceolate, entire, smooth, toothed, not pungent; flowers leafless, with soft spines." Linn. *Root* annual. *Stem* eighteen inches high, upright, grooved, smooth, sparingly branched. *Leaves* alternately scattered, attenuated to the base, sometimes a little decurrent, unequally toothed; teeth ending in a little evanescent bristle, slightly channelled, and somewhat rigid. *Flowers* yellowish white, terminal, solitary; calyx cylindrical, oblong, broader at the base; scales linear, all pressed close, yellow, ending in a weak spine. *Seeds* top-shaped, four-cornered; down abundant, feathery. Cav. Found in Spain by Loeßing, and in Silesia by Krock. 50. *C. leucanthus*, Willd. 34. Cavan. ic. 2. p. 52. tab. 165. "Leaves oblong-lanceolate, sessile, smooth, serrated, not pungent; stem one-flowered; calyx-scales reflexed." *Root* annual. A native of Spain. 51. *C. heterophyllus*, Linn. Sp. Pl. 20. Mart. 30. Engl. Bot. tab. 675. (*Carduus helenoides*, Lam. 42. Hudf. p. 352. Lightf. p. 457. With. p. 702. Hull. p. 179. *Cnicus heterophyllus*, Willd. 24.) Melancholy thistle. "Leaves embracing the stem, lanceolate, ciliated, entire; sometimes, but rarely, lacinated; downy underneath, flower often solitary, peduncled." *Root* perennial, knotty, black. *Stem* three feet high or more, erect, generally simple, one or two-flowered, round, furrowed, woolly. *Leaves* acute, green, smooth above, white with down underneath, doubly ciliated with small spines at the edges, occasionally pinnatifid, whence the trivial name; root-leaves gradually lessening into rather long petioles; stem-leaves numerous, alternate, heart-shaped at the base. *Flower* purple, terminal, at first nodding, afterwards erect, large; peduncle elongated, downy, either naked, or with a short leaf immediately under the flower; calyx egg-shaped, slightly pubescent; scales lanceolate, erect, naked at the tip, keeled, brownish, ending in a short, obsolete spine; anthers white; stigma linear, exserted, purple, emarginate. *Down* of the marginal seeds nearly rough, of the rest feathery; a proof that Willdenow is not supported by nature in making its structure in this respect a sufficient generic distinction. There is frequently a smaller flower, on a rather long peduncle, in the axil of one of the upper leaves. A native of Switzerland, Dauphiny, and of the mountainous parts of England, Wales, and Scotland, flowering in July and August. 52. *C. helenoides*, Linn. Sp. Pl. 21. Mart. 31. (*Cnicus helenoides*, Willd. 25.) "Leaves embracing the stem, lanceolate, toothed, ciliated with small unequal spines; stem spineless." Linn. In habit much resembling the preceding, but twice the height. *Root* perennial, scarcely creeping. *Stem* furrowed, leafy from the top to the bottom. *Leaves* from 40 to 50, white underneath, but not snowy white, as in *C. heterophyllus*, toothed, not laminated, half embracing the stem with round, reflexed, adnate auricles; floral leaves awl-shaped. *Flowers* four or five at the top of the stem, only half the size of those in the preceding species. Willd. from a living plant. A native of Siberia. Dr. Smith assures us that he has not seen it either wild or cultivated in Great Britain. 53. *C. pratensis*, Mart. 40. Hudson, p. 353. Withering, p. 701. Smith Flor. Brit. 10. Eng. Bot. Pl. 177. (*C. dissectus*, Linn.? Hudf. 1st Ed. *C. heterophyllus*, Rel. 306. Lightf. p. 456. *C. anglicus*, Lam. 43. *Cirsium anglicum*, Rav. Syn. 193. Lob. Ic. 583. Ger. Emac. 1183. Pet. Herb. Brit. tab. 22. fig. 1. *Cnicus pratensis*, Willd. 23.) Meadow thistle. "Leaves sessile, lanceolate, some-

what toothed, ciliated, woolly underneath; stem nearly naked, one-flowered; calyx villous." *Root* perennial, creeping; fibres long, simple, fleshy. *Stem* erect, about a foot and half high, simple, seldom more than one-flowered, round, furrowed, woolly. *Leaves* unequally toothed, sometimes a little scolloped, ciliated with stronger and more pungent spines than those of *C. heterophyllus*, roughish, cobwebbed beneath, but not snowy white; root-leaves three or four, petioled; stem-leaves two or three, smaller, remote, embracing the stem. *Flower* purple, terminal, at first nodding, afterwards erect; peduncle a little thickened at the top, snowy white; scales lanceolate, erect, ending in a weakish spine; down as in *C. heterophyllo*. A native of marshy places in France and England. We are informed by Dr. Smith, (Eng. Bot.) that Linnaeus took up his dissections from books, without having it in his herbarium. All his synonyms are said by La Marck to belong to the present plant, specimens having been sent him from the neighbourhood of Orleans, which perfectly agree with Lobel's figure. It seems, therefore, probable that he accidentally prefixed an erroneous specific character to his synonyms, and that his dissection has no separate existence. 54. *C. ferratuloides*, Linn. Sp. Pl. 22. Mart. 32. Lam. 47? Gmel. Sib. ii. p. 52. tab. 22, and 23. fig. 1. Jacq. Vind. 281. Aust. 2. tab. 127. (*Cnicus ferratuloides*, Willd. 26.) "Leaves embracing the stem, lanceolate, entire; ferratures spinous bristle-shaped; peduncles one-flowered." Linn. "Leaves sessile, lanceolate, remotely ferrated, ciliated, with small spines, green on both sides; calyxes not pungent, globularly conic; down feathery, very long." Lam. According to Linnaeus it differs from *C. helenoides* in its smaller, scarcely furrowed stem, and narrower leaves, with the floral ones lanceolate, not awl-shaped. Willdenow adds that in this species the stem is branched, and the leaves green on both sides. La Marck asserts, that his ferratuloides resembles his helenoides (which, however, is heterophyllus), in nothing but the generic character. It appears, nevertheless, from his description, that there are many points of resemblance, and that his plant is probably the ferratuloides of Linnaeus, as we think it certainly is that of Willdenow and Jacquin, though Jacquin says the stem is simple when wild, and branched only when cultivated. A native of Siberia, Switzerland, and Austria. 55. *C. tartaricus*, Linn. Sp. Pl. 23. Mart. 33. Lam. 33. Jacq. Aust. tab. 90. (*Cnicus Tartaricus*, Willd. 35.) "Leaves embracing the stem, lanceolate; ferratures spinous awl-shaped; flowers with three leaves." Linn. "Leaves embracing the stem, oblong-lanceolate, toothed, ciliate-spinous; peduncles one-flowered; calyxes bracteate; scales lanceolate, spinous. Willd. Habit and size of the preceding. Linn. *Root* perennial. *Stem* a foot and a half high, smooth, sometimes simple, and sometimes with a branch or two, each bearing a single flower. *Leaves* a little scolloped, toothed, smooth on both sides; root-leaves large, petioled; stem-leaves rather distant. *Flower* yellowish white; bractes generally three, small, lanceolate, ciliated. La Marck. Calyx-scales with a white keel. Linn. A native of Siberia and the Alps. 56. *C. carnolicus*, Mart. 41. (*Cnicus carnolicus*, Willd. 33. *Cirsium carnolicum*, Scop. Carn. n. 1005. tab. 54.) "Leaves heart-shaped, embracing the stem, oblong-egg-shaped, toothed, ciliated; root-leaves oblong, obtuse, scolloped, ciliated; flowers terminal, somewhat clustered; calyxes involucre; scales linear-lanceolate, spreading. Willd. *Root* perennial. *Stem* hairy. *Root-leaves* petioled, hairy on both sides; petioles hairy. *Flowers* yellowish white; calyx involucre, with three lanceolate ciliate leaves. Willd. 57. *C. angustifolius*, Lam. 34. "Leaves sessile, long, narrow; tooth-pinnatifid, ciliated; flower involucre by about six linear bractes. *Stem* near two feet high, a little branched, and

somewhat woolly. *Leaves* green, smooth on both sides, some opposite, others alternate. *Flowers* solitary, terminal. Cultivated in the royal garden at Paris, and said to be a native of the Alps. 58. *C. acanthifolius*, Lam. 32. (*Cnicus pratensis acanthi folio*, flore flavescente, Tourn. Inf. 450. *Carduus pratensis latifolius*, Bauh. Pin. 376. *Cirsium*, Hall. 173.) "Leaves embracing the stem, long, pinnatifid; pinnules parallel, ciliate-spinous; bractes concave, entire, rather coloured, covering the flowers." Nearly allied to the three preceding. *Root* perennial. *Stem* striated, smooth, weak. *Leaves* large, distant, pale green; lower ones narrowing into the petiole. *Flowers* yellowish white, terminal, clustered; bractes ciliated. A native of meadows in many parts of Europe. 59. *C. pauciflorus*. (*Cnicus pauciflorus*, Willd. 34. Waldst. and Kitaib. Pl. Rar. Hung.) "Leaves embracing the stem, egg-shaped, somewhat lyrate, ciliate-ferrated, rugged; root-leaves lyrate; flowers clustered; calyx-scales lanceolate; the inner ones spreading." *Root* biennial. *Stem* naked towards the top, with three or four clustered, terminal flowers. *Leaves* paler underneath; root-leaves a foot long, oblong, broad, a little scolloped. A native of Hungary. 60. *C. antarcticus*, Vill. Delph. iii. p. 12. tab. 19. (*Cnicus antarcticus*, Willd. 32.) "Leaves heart-shaped, embracing the stem, pinnatifid, lanceolate at the top, ciliate-spinous, rather woolly underneath; flowers clustered; calyx-scales lanceolate egg-shaped, mucronate, spreading at the tip." *Root* perennial. *Leaves* dilated at the base, pinnatifid and toothed in the middle, elongated, and lanceolate at the end. *Flowers* white, terminal. 61. *C. semipinnatus*, Lam. 41. "Leaves embracing the stem, entire at the base, pinnatifid-pectinate towards the top, green on both sides; branch-leaves very entire; flowers rather clustered, terminal." *Root* perennial. *Stem* two or three feet high, more or less branched. *Leaves* divided in their upper part into lanceolate segments resembling the teeth of a comb, each ending in a spine. *Flowers* two or three together, pale or yellowish, acquiring a purple tint from the colour of the anthers; calyx smooth, not pungent. Cultivated in the royal garden at Paris, supposed to have been brought from Tartary. 62. *C. montanus*. (*Cnicus montanus*, Willd. 31. Waldst. and Kitaib. Pl. Rar. Hung.) "Leaves embracing the stem, pinnatifid, rugged, spinous-ciliated; segments alternate, oblong-lanceolate, three-nerved; stem branched; flowers clustered; calyx-scales egg-shaped, spreading at the tip." *Root* perennial. *Flowers* purple. A native of dry mountains in Croatia. 63. *C. rivularis*, Mart. 36. Jacq. Aust. i. tab. 91. (*Cnicus rivularis*, Willd. 30.) "Leaves toothed, ciliated, naked, embracing the stem; root and lower stem ones pinnatifid; flowers clustered, capitate; calyx scales lanceolate-egg-shaped, pressed close." Willd. *Root* perennial. *Stem* usually single, two or three feet high, erect, round, hollow, a little villous, angular at the bottom, striated at the top, with a few distant bractes; generally quite simple but sometimes with short, one-flowered, axillary branches; sometimes, especially towards the top, covered with a white wool; ending either in a single flower, or a few collected into a head, rarely six or seven, and in that case the lower ones are peduncled. *Leaves* somewhat villous, deeper green above, whitish underneath; root ones lanceolate, narrowing into the petiole. *Flowers* purple; calyx egg-shaped, somewhat glutinous, but not villous; scales lanceolate-acuminate, not pungent, outer ones dark green, inner ones dark purple and gradually longer; down somewhat scattered. A native of Austria and Hungary. Professor Martyn has quoted Scopoli n. 1005. tab. 54. under both *C. carnolicus* and *C. rivularis*, adding to the latter a reference to Jacquin, and by referring from one to the other, seems to think they may possibly

possibly be the same plant. He has nevertheless given distinct descriptions of each, of the former from Scopoli, and of the latter from Jacquin, which do not very well accord with each other. Willdenow, who had dried specimens of both, has kept them separate. 64. *C. salisburgensis*, (Cnicus salisburgensis; Willd. 29.) "Leaves toothed, ciliated, naked; stem-leaves embracing the stem, pinnatifid, root ones undivided, oblong; stem two-flowered; calyx-scales egg-lanceolate, pressed close." Root perennial. Stem hairy. Leaves smooth, beset with very short, scattered hairs. A native of moist meadows about Saltzburg. 65. *C. rigens*, Mart. 47. Hort. Kew. 3. p. 144. La Chenal in Act. Helv. 4. p. 294. tab. 16. (Cnicus rigens; Willd. 28. Cirsium; Hall. n. 176.) "Leaves oblong-lanceolate, smooth, spinous at the edges, pinnatifid; segments obliquely lobed; calyxes oblong, bracteate." Martyn supposes it to be the same with *C. antarcticus* of Villars, see n. 57. A native of Switzerland. 66. *C. Allionii*, (Cnicus medius; Willd. Cirsium medium, Allion. ped. n. 542. tab. 49.) "Leaves sessile, pinnatifid; segments generally three-cleft, ciliate-spinous; stem branched, calyxes naked; scales, egg-lanceolate, mucronate, pressed close." Root perennial. Perfectly distinct from *C. medius* of Gouan (see n. 27.) which has been quoted as a synonym, notwithstanding it has decurrent leaves. Willd. from a living plant. 67. *C. radiatus*, Willd. 28. "Leaves pectinate-pinnatifid, naked, rugged; segments linear, not pungent, terminal one egg-shaped; upper leaves sessile; calyx-scales egg-shaped, mucronate; inner ones elongated, linear, coloured." Root perennial. Stem branched, many-flowered. Leaves green on both sides; lower ones petioled. Flowers violet. Down capillary. A native of calcareous mountains in Hungary. 68. *C. lycopifolius*, Willd. 29. Villars delph. 3. p. 23. tab. 19. "Leaves egg-shaped, pinnatifid-toothed, not pungent, grey underneath; upper ones sessile; stem one-flowered; calyx-scales egg-shaped, not pungent." Similar in habit to the preceding. Root perennial. A native of mountains in Dauphiny. 69. *C. nitidus*, Willd. 32. Walldt. and Ritab. pl. rar. Hung. 1. p. 52. tab. 52. "Leaves not pungent; root-leaves egg-shaped, toothed, cut at the base; stem-leaves pinnatifid-linear; stem one-flowered; calyx-scales egg-shaped, mucronate." Root perennial. Upper leaves entire, linear-lanceolate. A native of calcareous mountains in Hungary. 70. *C. erisibales*, Lam. 36. Jacq. Obs. 1. p. 28. tab. 17. and Aust. tab. 310. (Cnicus erisibales; Linn. Sp. Pl. 4. Willd. 37. Cirsium acanthoides montanum, flore flavescens: Tourn. Ilust. 448.) "Lower leaves petioled, egg shaped, deeply pinnatifid; pinnules parallel, three-nerved; peduncles naked, one-flowered." Root perennial. Stem a foot and half high, generally simple, nearly smooth. Leaves nearly smooth, greenish; lower leaves near together, toothed, spinous-ciliated; upper ones embracing the stem, distant, narrow. Flowers yellowish white, terminal, nodding. A native of France and other temperate parts of Europe. 71. *C. tricephalodes*, Lam. 35. (Cirsium: Hall. helv. n. 175. Cardus-cirsium maximum profunde laciniatum. Pluk. tab. 154. fig. 2.) "Leaves embracing the stem, pinnatifid, serrated, ciliated; flowers sessile, about three, clustered at the top of the stem." Root perennial. Stem two or three feet high, simple, a little cottony under the flowers. Lower leaves petioled, egg-shaped, a little cut or doubly toothed, green and smooth above, with short hairs on their hindmost nerves; upper leaves embracing the stem, deeply pinnatifid; pinnules parallel, narrow, ciliated. Flowers purple; calyx smooth, not pungent. A native of Auvergne and Dauphiny. La Marck observes, that this and the preceding have been confounded by Linnæus and Haller. 72. *C. ochroleucus*, Mart. 44. (Cnicus ochroleucus; Willd. 38.

Cirsium; Allion. ped. n. 546. Hall. helv. n. 174.) "Leaves embracing the stem, decussively pinnatifid, ciliated, pinnules lanceolate, three-nerved, upper ones confluent; peduncles drooping; calyx-scales lanceolate, reflexed." Root perennial. Flowers yellowish white. A native of Switzerland and Savoy. 73. *C. hastatus*, Lam. 37. "Leaves embracing the stem, halbert-lanceolate, pinnatifid, grey underneath; flowers about seven, clustered at the top of the stem; terminal one erect." Stem a foot and half high, simple, abundantly leafy, cottony in its upper part. Leaves acuminate, green and smooth above, white and cottony underneath, pinnatifid half way down; pinnules narrow, curved upwards, ending in a weak spine. Flowers large, purple; calyx smooth, not pungent. A native of the Alps about Grenoble. 74. *C. erucagineus*, Lam. 38. "Leaves embracing the stem, pinnatifid; pinnules lacinated upwards." Stem two feet high or more, cottony towards the top. Leaves green and almost smooth above, slightly villous and pale underneath, spinous ciliated; root leaves large, petioled; stem ones smaller, embracing the stem. Flowers large, whitish with a red tint from the colour of the anthers, partly clustered several together at the top of the stem, partly solitary, peduncled, in the axils of the upper leaves; calyx smooth, not pungent. Cultivated in the royal garden at Paris, and said to be a native of Siberia. 75. *C. altissimus*, Linn. Sp. Pl. 17. Mart. 28. Lam. 39. (Cnicus altissimus; Willd. 20. Cirsium altissimum; Dill. Lit. 81. tab. 69. fig. 80.) "Leaves sessile, pinnatifid, scoloped, serrated, not pungent; stem much-branched; calyxes villous, somewhat serrated." Root perennial. Stem ten or twelve feet high. Leaves green above, cottony and whitish underneath. Flowers purple, single at the top of each branch; calyx woolly; bractes several, narrow, toothed, forming an involucre. 76. *C. bulbosus*, Lam. 44. (*C. bulbosus* Monspeliensium, five acanthus silvestris quibusdam, foliis laciniatis, J. Bauh. 3. p. 43. *C. bulbosus* monspeliensium; Lob. ic. n. p. 10. Cirsium, Hall helv. n. 177.) "Stem naked above, with one or two flowers; leaves deeply pinnatifid; pinnules cut, lobed, ciliated, ending in a small spine; flowers solitary." Root composed of several bulbs or tubes. Stem a foot and half or two feet high, slender, striated, cottony, especially near the top, with two or three leaves on its lower part. Leaves almost all petioled, greenish above, and beset with short, thinly scattered hairs, cottony and white underneath. Flowers purple, rather small, terminal; scales egg-shaped-acuminate, not pungent. A native of Germany, Switzerland, and the south of France. There is a variety in the neighbourhood of Paris, with leaves almost entirely green. La Marck observes that Linnæus was probably unacquainted with this plant, having erroneously referred Lobel's *C. bulbosus* to his *tuberosus* from which it is perfectly distinct, its leaves not being decurrent. He conceives that the *tuberosus* of Linnæus may possibly be the plant which he has described under the name of *pratensis*, and which we on account of the uncertainty have called ambiguous, (see n. 33) *pratensis* as a specific name being pre-occupied. 77. *C. laciniatus*, Lam. 45. (*Jacea aculeata* f. *tuberosa*; Tabern. ic. 154. "Stem leafy, branched; leaves deeply pinnatifid, green on both sides; pinnules lacinated, spinous ciliated; peduncles one flowered." Distinct from the preceding. Its leaves are not decurrent; it therefore is not the *tuberosus* of Linnæus. Stem a foot and half high, smooth, channelled. Leaves large, somewhat petioled. Flowers large, purple or white, peduncled; calyx not pungent. Described from a dried specimen in the herbarium of Jussieu, and supposed to be a native of the Alps. 78. *C. arvensis*, Lam. 46. Curt. Flor. Lond. fasc. 6. tab. 57. Smith. Flor. Brit.

CARDUUS.

p. 851. Eng. bot. 975. *C. ferratula arvensis*, Linn. Sp. Pl. Mart. Willd. *Carduus vulgarissimus viarum*, Rai syn. 194.) Creeping or way thistle. "Leaves sessile, pinnatifid, spinous; stem paniced; calyxes egg-shaped, slightly spinous; down feathery." Root perennial, creeping, tapering, descending deep into the ground, not easily extirpated. Stems three feet high, erect, round, smooth, many-flowered. Leaves slightly decurrent, alternate, smoothish; lobes unequal, ciliated, spinous. Flowers purple, rarely white; calyx egg-shaped; scales broad-lanceolate, pressed close, woolly at the edges, with a short, spreading spine; down deciduous, root permanent as in *ferratula*. Dr. Smith. A native of most parts of Europe. 79. *C. discolor*, (Cnicus discolor, Willd. 189.) "Leaves sessile, pinnatifid, hairy, downy underneath; pinnules two-lobed, divaricated, spinous; calyxes globular, cobwebbed, pubescent, scales egg-shaped, pressed close, ending in a spreading spine." Root biennial. A native of North America. 80. *C. orientalis*, (Cnicus orientalis; Willd. 17.) "Leaves sessile, pinnatifid, smoothish above, downy underneath; pinnules lanceolate, spinous; calyxes egg-shaped; scales pressed close: outer ones awl-shaped, inner ones lanceolate." Stem downy. Leaves narrow, downy on the midrib above, snow-white underneath: pinnules with a spine at the tip, and at the upper part of the base. Calyx only half the size of that of *C. lanceolatus*. A native of the East. 81. *C. cynaroides*, Lam. 28. (*C. creticus foliis lanceolatis*, Toura. Cor. 31. Cnicus cynaroides; Willd. 16.) "Leaves sessile, oblong, pinnatifid, downy underneath; pinnules angular, divaricated, spinous; flower large, terminal." Stem erect, striated, cottony. Leaves smooth, and shining above, very white underneath. Flower purple; calyx-scales lanceolate, pungent; outer ones reflexed, and widely spreading. A native of the isle of Candia. 82. *C. ciliatus*. Hort. Kew. 3. p. 144. Murray Com. Goett. 1784. p. 35. tab. 5. (Cnicus ciliatus; Willd. 12.) "Leaves embracing the stem, hispid, pinnatifid; pinnules two-lobed, divaricated, spinous, downy underneath; calyxes egg-shaped, scales lanceolate, spinous, ciliated, reflexed." Root perennial. Stems many from the same root, five or six feet high, hairy, round, with prominent lines, and horizontal white hairs, branched on the upper part; branches about a foot long, compound, alternate, ascending; branchlets three, short, zig-zag. Root-leaves a foot and half long, spreading in all directions. Stem-leaves about a foot long, half embracing the stem, horizontal, alternate, rough, and green above, with straw-coloured veins, which end in awl-shaped spines of the same colour. Flowers terminal, solitary, yellowish white; calyx cylindric, oblong, broader at the base; scales yellow, linear, pressed close, ending in a weak spine. Seeds top-shaped, four-cornered; down abundant, feathery. A native of Siberia. 83. *C. leucocephalus*. (Cnicus leucocephalus; Willd. 13. *Cirsium creticum altissimum C. lanceolati folio flore albo*; Tourn. Cor. 32.) "Stem-leaves sessile, pinnatifid, hispid, downy underneath; pinnules lanceolate, spinous at the tip; calyxes cylindrical, alternate, villous, involucred, scales oblong, pressed close, ending in recurved spines." Willd. Root-leaves petioled; pinnules lanceolate, two-lobed, divaricated, ciliated at the edges, spinous at the tip; pinnules of the stem-leaves undivided, revolute at the edges; with a strong, yellow spine at the tip, at the bottom of each indenture. Flowers alternate, axillary, on short peduncles; involucre of three or five leaves. A native of Crete. 84. *C. echinatus*. Defon. atl. 2. p. 247. (Cnicus echinatus, Willd. 14.) "Leaves sessile, pinnatifid, hispid, woolly underneath; pinnules two-lobed, divaricated, spinous; calyxes egg-shaped, woolly, bracteated; scales awl-shaped, spinous, pressed close. Stem a foot high, erect, firm, furrowed, woolly; branches erect, forming a kind of corymb, one-flowered. Leaves resembling

those of *C. lanceolatus*; hispid above, with numerous short, yellowish hairs, repand-pinnatifid; lobes remote, ending in a long yellowish spine, solitary or in pairs, one larger. Flowers a third part longer than those of *C. lanceolatus*; peduncles leafy, striated, woolly; bractes narrow-lanceolate, surrounding the calyx; calyx egg-shaped, woolly; scales closely imbricated, spinous and loose at the tip. Desf. A native of Barbary. 85. *C. eriophorus*. Linn. Sp. Pl. 16. Murt. 27. Lam. 29. Eng. bot. 386. (Cnicus eriophorus, Willd. 15.) Fryars crown. Fryars thistle. Woolly headed thistle. "Leaves sessile, pinnatifid, in two ranks, spinous, rugged; pinnules alternate, erect; calyxes globular, woolly." Root biennial. Stem three or four feet high, erect, round, furrowed, smoothish, many-flowered, much branched; branches spreading. Leaves spreading, alternate, deeply pinnatifid with two ranks of oblong divaricated segments, which point alternately upwards and downwards, armed with strong spines, rough above with small rigid, close-pressed bristles, woolly underneath. Flowers purple, or white, large, terminal, solitary, erect; peduncle leafy; calyx globular, or somewhat depressed; scales linear, numerous, spreading, beautifully cobwebbed, tipped with a leafy appendage, coloured, ciliated, smooth, mucronate-spinous; down feathery, deciduous. A native of England and most parts of Europe, on a calcareous soil. 86. *C. ferox*, Lam. 30. (Cnicus ferox; Linn. Mart. 109. Mart. 3. Willd. 11. *Cn. lanceolatus validissimus aculeis*, Tourn. Inst. 450. *Carduus tomentosus*, Lobel. ic. 2. p. 11.) "Leaves sessile, pinnatifid; pinnules lanceolate, distant; flowers large; bractes linear, very spinous." La Marck observes that this plant is so far from being of a different genus from the preceding, as Linnæus makes it, that it is scarcely a distinct species. Root biennial. Stem not so high as that of *C. eriophorus*. Leaves sessile, or a little embracing the stem, not decurrent as represented by Linnæus, greenish, and rough with numerous spines above, a little cottony, and whitish underneath. Flowers large, purple; bractes ending in a strong spine, rough at their edges and over their whole surface, with a great number of very sharp spines. A native of the south of France. 87. *C. spinosissimus*, (Carduus comosus, Lam. 31. Cnicus spinosissimus, Linn. Sp. Pl. 3. Mart. 6. Willd. 48. *Carlina polycephalos alba*, Bauh. pin. 380. *Cirsium*, Hall. helv. n. 172. tab. 5. *Cirsium spinosum*, Gmel. Sib. 2. p. 64. tab. 25.) "Leaves embracing the stem, lanceolate, pinnatifid, spinous; stem simple; flowers sessile, clustered at the top among numerous leaves." β . "Heads of flowers naked, without spines." Stem a foot and half high, furrowed. Leaves near the flowers close set, pubescent, yellowish, with long sharp spines. Flowers yellowish white: calyx-scales smooth, ending in a long spine. A native of the Alps. If β be not, as Haller thinks it, a distinct species, it is a very remarkable variety, Lam. 88. *C. echinocephalus*. (Cnicus echinocephalus; Willd. 49.) "Leaves sessile, rigid, deeply pinnatifid, downy underneath; pinnules linear, spinous at the tip; calyxes globular, smooth; scales lanceolate, spinous, spreading." Root perennial. Stem from four to six inches high, simple, erect, downy. Leaves alternate, crowded; pinnules entire, distant. Flowers solitary, terminal, or on short branches from the axils of the upper leaves; calyx-scales purple. A native of Tauria. De Boeher. 89. *C. acaulis*, Linn. Sp. Pl. 26. Mart. 38. Lam. 49. Eng. bot. 161. (Cnicus acaulis, Willd. 40.) Dwarf thistle. "Stemless; calyx smooth." Root perennial, woody, blackish. Leaves depressed, spreading in a radiate manner, and covering a space often not less than a foot in diameter, petioled, smooth, pinnatifid; pinnules somewhat palmated, spinous. Flowers purple, large, generally solitary, almost sessile; calyx

CARDUUS.

calyx egg-shaped ; scales lanceolate, scarcely keeled ; somewhat ciliated at the tip, slightly spinous. A native of gravelly and chalky pastures in many parts of Europe, not a general English plant, but abundant in Norfolk, where it is the pest of the sheep downs. When cultivated in a garden, and sometimes when wild on a rich soil, a stem is produced bearing several flowers ; it is then the *C. dubius* of several German botanists. 90. *C. inermis*, (*Cnicus inermis*, Willd. 22.) "Leaves sessile, lanceolate, gashed, toothed, downy underneath ; root-leaves pinnatifid ; calyx-scales egg-lanceolate, membranous at the edge, pressed close." Root perennial. Stem furrowed, green, slightly villous. Root-leaves a foot long, or more, deeply pinnatifid, toothed ; lower stem-leaves five or six inches long, attenuated at the base, acuminate at the tip, pinnatifid in the middle ; upper ones undivided, attenuated both ways, toothed. Flower solitary, terminal, very large ; calyx-scales, as well as the whole plant, without spines. Native country unknown. 91. *C. pinnatifidus*, Cavan. ic. 1. p. 58. tab. 83. (*Cnicus pinnatifidus*, Willd. 47.) "Leaves petioled, oblong, pinnatifid, toothed, woolly ; calyx cylindrical, terminal, scales pressed close, oblong, cartilaginously mucronate ; tips spreading." Root annual. Stem four or five inches high, simple, erect, downy. Leaves egg-shaped, somewhat lyrate, without spines, clothed on both sides with a fine wool ; midrib and veins downy. Flower solitary. A native of Spain. 92. *C. centauroides*, (*Cnicus centauroides*, Linn. Sp. Pl. 5. Mart. 7. Willd. 50. *Centaureum majus*, foliis ciliaræ cornuti ; Morif. hist. 3. p. 131. tab. 25. fig. 2.) "Leaves pinnatifid ; calyxes scarious ; scales acuminate." Root perennial. Leaves without spines. A native of the Pyrenees and of Siberia ; Georg. it. 1. p. 229. 93. *C. uniflorus*, (*Cnicus*, Linn. Mant. 572. Mart. 8. Willd. 51. *Centaurea calycibus membranaceis*. Gmel. Sib. 2. p. 86. tab. 38.) Root perennial. Stem two feet high, erect, somewhat angular, scarcely woolly, one-flowered. Leaves numerous, sessile, without spines ; greyish ; pinnules alternate ; upper leaves smaller, more nearly entire ; root-leaves petioled ; segments lanceolate, serrated. Flower violet, terminal, sessile ; calyx large, globular ; scales loose, egg-shaped, villous, grey ; florets six-cleft ; segments linear, acute ; stamens white, longer than the corolla ; style longer than the stamens, thread-shaped, violet. Willd. A native of Siberia. 94. *C. carthamoides*, (*Cnicus carthamoides*, Willd. 52.) "Leaves without spines, sessile, oblong, toothed ; root-leaves some undivided, others pinnatifid ; calyx scarious, villous." Root perennial. Stem erect, round, thick, striated. Flower purple, large, terminal, solitary ; calyx-scales roundish-egg-shaped. Willd. A native of Siberia. 95. *C. cernuus*, (*C. cernuus*, Linn. Sp. Pl. 6. Willd. 53. Mart. 9. *Carduus*, Gmel. Sib. 2. p. 47. tab. 19.) "Leaves embracing the stem, egg-shaped, toothed ; root-leaves heart-shaped ; petioles winged, spinous-toothed ; calyx scarious, generally solitary, drooping, terminal ; root-perennial. A native of Siberia. 96. *C. mollis*, Linn. Sp. Pl. 25. Mart. 37. Willd. 36. (*C. mollior* 1. Clus. hist. 2. p. 151. *C. foliis decussive interrupteque pinnatis* ; Gouan illust. p. 63. *Cirsium*, Jacq. vind. 276. anst. tab. 18. Scop. Carn. 4. 1000.) "Leaves pinnatifid, linear, revolute at the edges, downy ; stem nearly naked, one-flowered ; calyx-scales downy, egg-lanceolate, squarrous." Willd. Root perennial. A native of Austria, and the south of France. La Marck asserts that the plants of Clusius and of Gouan are perfectly distinct, and that both of them are strictly species of *Serratula*. We have our doubts whether our six preceding ones do not properly belong to that genus, their calyx-scales not appearing truly spinous in the most lax sense of the term ; but as Willdenow has placed them under his *Cnicus*, of which a spinous calyx-

scale enters into the essential character, we have not thought fit to remove them. In the membranous, cartilaginous or squarrous edgings and terminations of their calyx-scales, they may be thought to approach those species of *Carthamus* which have leafy appendages to those scales. This is still more the case with *C. eriophorus*. But as a compound spine, or more than one to each scale, forms the essential generic character of *Carthamus*, as La Marck has determined it, they cannot be placed under that genus. La Marck's distinction, indeed, is altogether artificial ; and it would perhaps be more conducive to scientific accuracy and perspicuity if *Carthamus* as well as *Cnicus* were incorporated with *Carduus*. The genus would not be much larger ; and it might easily be divided into well-defined sections, if we had thought that the form of our work authorizes us to innovate such a change, and have relieved us from the necessity, to which we have reluctantly submitted, of no longer calling the well known *marianus* a *carduus*. But all the liberty that we allow ourselves is to exercise our own judgment when authors differ, and to follow those who appear to us to have most closely followed the steps of nature.

Of the propagation and culture of plants of this genus, little is to be said. In their wild state, the Author of nature has made abundant provision for their increase, by annexing to their seeds a light, and often feathery down, which makes them readily float in the air, and scatters them far and wide over all the neighbouring fields. As they are usually considered rather in the light of noxious weeds than of ornamental plants, few of them are admitted into the flower garden or greenhouse ; and those few are valued more for their rarity than for their beauty. Some of them, however, if it were not for the general prejudice against them, might with advantage be sparingly introduced into the borders of the pleasure ground. Of the native English species, the *eriophorus*, the *heterophyllus*, and the *nutans* are the most striking. The first two have the additional recommendation of being not common ; and we should suppose that every one who spends any part of the summer months at Buxton, must think the close ranks of the last which line the sides of all the stone walls, a real ornament to that naked country.

By the farmer the whole tribe is held in abhorrence, and marked for destruction. The annual and biennial kinds are easily got rid of by cutting them down with a weeding hook in corn fields, and moving them in pastures before they ripen their seeds. But those that are perennial can be extirpated only by plowing the fields, and carefully gathering the roots. Of these, the most tormenting to the English farmer is the *arvensis*, which on account of its creeping root that strikes deep into the ground, has been called by Curtis the cursed thistle. Thistles in general, it cannot be denied, make part of the curse pronounced upon the ground at the original fall of man from his native innocence. "Curfed is the ground for thy sake : thorns and thistles shall it bring forth to thee : in the sweat of thy face thou shalt eat bread, till thou return unto the ground." In what manner the human race would have lived if they had never sinned, we are not able to determine ; and as we have no experience to assist us in our inquiries, it would be folly to attempt to guess. But of this we are certain, that with their present feelings and habits, they cannot attain even to a moderate degree of happiness unless they engage in some kind of useful labour. A blessing has, therefore, been graciously intermingled with the curse. To fallen man it is an advantage, for which he ought to be highly thankful, that he is obliged to cultivate the earth for the comfortable support of his life, and that no part of the produce of the ground is spontaneously raised to that state of excellence which is most conducive to his enjoyment.

Let.

Let no one then presume to assert that thistles are made in vain, even though it should be allowed that they have no other use than to preserve a considerable part of mankind, either from the intolerable listlessness of doing nothing, or from the painful consciousness of having done mischief. On this supposition they are not without a final cause, in which the wisdom and the goodness of the adorable Creator are equally conspicuous.

But in the works of God there is always a manifold use. Linnæus has observed, that the *carduus lanceolatus* protects by its spines the annual plants which have sown themselves in its neighbourhood, and gives them an opportunity of maturing their seeds without disturbance. Dr. Withering adds, that if a heap of clay be thrown up, nothing would grow upon it for several years if the seeds of this plant were not wasted to it by the winds, which vegetate and afford shelter for other plants, so that the whole becomes fertile. The truth of the latter observation we are rather inclined to doubt. But supposing it to have little or no foundation in fact, the pious philosophical mind will readily perceive other valuable purposes in the general economy of nature, to which this despised and hated race of vegetables are subservient. The seeds afford sustenance to several kinds of birds, which either serve to replenish our tables, or delight us with the melody of their notes, the beauty of their plumage, and the elegance of their flight. The leaves are eaten by various insects, which though they do not appear immediately useful to man, may, for ought we know, be important links in the great chain of creation, on which the welfare of the whole depends. Or, if they be not either immediately or remotely useful to man, who will presume to think that infinite benevolence may not create distinct ranks of beings, merely for the sake of giving them capacities and means of enjoyment, and of adding to the general mass of happiness which is bountifully diffused through the universe?

CARDUUS marianus, Linn. See *CARTHAMUS marianus*.

CARDUUS foliis spinosis ad instar juniperi, Morif. See *DOYPSIS spinosa*.

CARDUUS brasiliensis, foliis aloes, Bauh. pin. See *BROMELIA avaras*.

CARDUUS acanthus f. *branca urfi*, Bauh. hist. See *ACANTHUS mollis*, or *smooth Acanthus*.

CARDUUS aquaticus f. *Indorum*, Cammel. luz. See *ACANTHUS ilicifolius*, or *holly-leaved Acanthus*.

CARDUUS personata, Jacq. Aultr. tab. 348. Willd. 1. 12. See *ARCTIUM personata*, where we have described it. But as its calyx-spines, though reflexed, are not hooked, it is properly a *carduus*.

CARDUUS inermis, Hall. helv. n. 162. Capitalis in vertice congestis, squamis reflexis, Gmel. Sib. 2. tab. 24. See *ARCTIUM personata*.

CARDUUS tinctorius, Scop. Carn. n. 1012. inermis, Hall. helv. n. 163. See *SERRATULA tinctoria*.

CARDUUS inermis, Gmel. Sib. 2. tab. 20. See *SERRATULA coronata*.

CARDUUS caule ramofo, Gmel. Sib. 2. n. 38. tab. 17. See *SERRATULA centauroides*.

CARDUUS pratensis latifolius, Bauh. pin. 376. Lob. ic. 2. p. 11. See *CARTHAMUS oleraceus*.

CARDUUS cœruleus erectus, Morif. hist. 3. tab. 34. fig. 19. See *CARTHAMUS tingitans*.

CARDUUS chamæleon, Morif. hist. 3. tab. 33. fig. 17. See *CARTHAMUS corymbosus*.

CARDUUS xeranthoides, Rai Sup. 199. See *XERANTHEMUM proliferum*.

CARDUUS athiopicus, Pluk. phyt. 273. See *GORTERIA personata*.

CARDUUS benedictus, Bauh. pin. 378. Cam. epit. 562. See *CENTAUREA benedicta*.

CARDUUS lufitanicus, Tourn. inst. 441. See *CENTAUREA eriophora*.

CARDUUS stellatus, Bauh. hist. 3. p. 89. Bauh. pin. 387. Rai Syn. 196. Muricatus, Clus. hist. 2. p. 7. See *CENTAUREA calcitrapa*.

CARDUUS stellatus, Magn. monsp. See *CENTAUREA calcitrapoides*.

CARDUUS stellatus luteus, Bauh. pin. 387. Rai Syn. 196. Col. ceph. 1. p. 30. tab. 31. See *CENTAUREA foliifitalis*.

CARDUUS galaëtitis, Bauh. hist. 3. p. 54. Tourn. 441. Rai hist. 313. tomentosum capitulo minore, Bauh. pin. 382. See *CENTAUREA galaëtitis*.

CARDUUS sphaerocephalus, Bauh. pin. See *ECHINOPS*.

CARDUUS fullonum, Lob. ic. 2. 17. See *DIPSACUS fullonum*.

CARDWANG, CAPE, in *Geography*, a cape on the N. coast of the island of Java. S. lat. 5° 55'. E. long. 107° 10'.

CARDY, or *CARGY*, two small rocks on the eastern coast of Ireland, about two cables' length E. of Newhaven point, and near a mile north of Balbriggan, in the county of Dublin, which are dry about half ebb. N. lat. 53° 38'. W. long. 6° 11'.

CARDYNUS, in *Ancient Geography*, a mountain of Asia, near the Tigris, and probably not far from Nisibis.

CARDYTENSES, a people of Asia, in Syria, inhabiting the small territory called Cyrestica, according to Pliny.

CARE', a place of Spain, between Liminium and Saragossa. Anton. Itin.

CAREARA, in *Geography*, a town of Persia, in the province of Segeftan; 85 miles S.E. of Kin.

CARECARDAMA, in *Ancient Geography*, a town of India, on this side of the Ganges. Ptolemy.

CAREDIVA, in *Geography*, an island of the Indian Ocean, on the western side of the island of Ceylon.

CAREENING, a term, in the *Sea Language*, used for the laying of a vessel on one side, to caulk, stop up leaks, and rest or trim the other side.

The word comes from *cariner*, which signifies the same, formed of the Latin *carina*, the keel of a ship.

A ship is said to be brought to a *careen*, when the greatest part of her lading, &c. being taken out, and a pontoon, or another vessel lower than herself, laid by her side, she is haled down to it as low as occasion requires, and there kept, by the weight of ballast, ordnance, &c. as well as by ropes, lest it should strain her masts too much. This is done with design to trim her sides, or bottom, to caulk her seams, or to mend any fault she has under water. Hence, when a ship lies on one side in sailing, she is said to *sail on the careen*.

Ships of war are generally careened every three years.

The *half careen* is when they can only careen half the ship, not being able to reach so low as the bottom of the keel.

CAREER, or *CARIER*, in the *Manege*, a place inclosed with a barrier, wherein they run the rings.

The word is also used for the race, or course of the horse itself, provided it does not exceed 200 paces.

In the ancient circus, the career was the space which the bigæ, or quadrigæ, were to run at full speed, to gain the prize. See *CIRCUS*.

CAREER,

CAREER, in *Falconry*, is a flight or tour of the bird, about 120 yards.

If it mounts more, it is called a *double career*; if less, a *semi-career*.

CAREK, in *Geography*. See **KAREK**.

CARELIA, a province of Eastern Finland, is now the government of *Viborg*; which see. This country became a part of Sweden in 1293; in 1338 part of it was surrendered to Russia; and in 1721 the greater part of the remainder was given up to the empire.

CAREMA, a town of Piedmont, in the marquise of Ivrea; 6 miles N.W. of Ivrea.

CAREMBOULE, a town of the island of Madagascar, near the south coast. S. lat. $25^{\circ} 20'$. W. long. $84^{\circ} 1'$.

CARENAGE BAY, a bay on the west coast of the island of St. Lucia. N. lat. $13^{\circ} 35'$. W. long. $60^{\circ} 50'$.

CARENAGE town. See **ST. GEORGE**.

CARENI, in *Ancient Geography*, a people mentioned by Pliny, and placed in the northern part of the isle of Albion, or in the north-western part of Scotland. They are also called *Carini*. They seem to have dwelt about Lochbay, on the N.W. coast of Ross-shire. Camden places them in Caithness.

CARENI, a people of Asia, towards Persia; placed by Steph. Byz. between the rivers Cyrus and Euphrates. Procopius says that these people offered to Cosroes money to avoid being pillaged; but that he refused it, because they were not Christians.

CARENAC, in *Geography*, a town of France, in the department of the Lot and Garonne, seated on the Dordogne; $2\frac{1}{2}$ leagues N.W. of St. Céré.

CARENTAN, a town of France, in the department of the Channel, and chief place of a canton in the district of St. Lô, situate in a marshy soil, which makes the air insalubrious. It has a port for small vessels; its principal commerce consists of butter and cattle. The place contains 2857, and the canton 11,951 inhabitants; the territory comprehends $182\frac{1}{2}$ kilometres and 15 communes. N. lat. $49^{\circ} 18'$. W. long. $1^{\circ} 21' 50''$.

CARENTIA, or **GARENTIA**, in *Ancient Geography*, a town of Italy, belonging to the Libici, placed by Cluvier towards the confluence of the Scilites and the Padus.

CARENTOIR, in *Geography*, a town of France, in the department of Morbihan, and chief place of a canton in the district of Vannes; the place contains 5310, and the canton 11,249 inhabitants; the territory includes 200 kilometres and 7 communes.

CARENTOMAGUS, in *Ancient Geography*, a place of Gaul, in Aquitania Prima, E. of Divona (Cahors), and W. of Segodunum (Rhodes).

CARENUE, in *Geography*, a town of the island of Ceylon; 54 miles N.W. of Trincomaly.

CAREOTÆ, in *Ancient Geography*, a people of European Sarmatia. Ptolemy.

CAREPULA, a town of Africa, placed by Ptolemy in Mauritania Cæsariensis.

CARERA, in *Geography*, a small trading place between Calicut on the coast of Coromandel, and Montipoli, or Great Poli, 31 leagues N. and N.E. by N. from it.

CARES, in *Ancient Geography*, a town of Spain, in the territory called Tarragonensis. Pliny.

CARES, or **KARES**, in *Geography*, a town of European Turkey, seated on mount Athos, in an elevated and pleasant situation; it has several convents, and a market every Saturday, for corn and other provisions; 17 miles S.E. of Saloniki.

CARESAN, or **CASSEN**, a sea-port town of Arabia Felix, seated on the Indian Ocean, 100 leagues N.E. from Aden. N. lat. $16^{\circ} 5'$. E. long. $52^{\circ} 7'$.

CARESENA, or **CARESENIA**, in *Ancient Geography*, a country of Asia, extending along the river Carefus, and bounded by Dardania, according to Strabo, who says that it is a mountainous, cultivated, and well peopled country, and that it derives its name from the river; which has its source at Malonte, a place situate between Palæcephus and Achæzium, over against Tenedos, and discharges itself into the *Ægeus*.

CARESTINI, **GIOVANNI**, in *Biography*, one of the greatest singers and actors that Italy ever produced, since the invention of the musical drama or opera. He arrived in England in the year 1733, when Handel first began his regency in the Haymarket at his own peril, after the Royal Academy of Music was dissolved, and the nobility and gentry had engaged a band of vocal and instrumental performers to oppose him. This separation, which was occasioned by a quarrel between Handel and Senesino, divided the musical part of the nation into two factions, which gained nothing by the conflict but the gratification of ruining each other. The powerful opponents with whom Handel had to contend hired the theatre in Lincoln's-inn Fields of Rich, the patentee, and engaged Senesino and Cuzzoni for principal singers, and Porpora to compose.

Carefini was born at Filatrana, in the march of Ancona, and at 12 years old went to Milan, where he was patronised by the Cusani family, whence he was frequently called *Cusano*. His voice was at first a powerful and clear soprano, which afterwards changed into the fullest, finest, and deepest counter-tenor that has perhaps ever been heard. His first appearance on the stage seems to have been at Rome, in the female character of Collanza, in Bononcini's opera of *Griselda*, 1721. In 1723 he was at Prague, during the great musical congress there, on occasion of the coronation of the emperor Charles VI. as king of Bohemia. In 1724 we trace him at Mantua; and in 1726 at Venice, where he performed with Farinelli, and the famous tenor Paita. In 1728 he was at Rome, and again in 1730, where he performed in Vinci's celebrated operas of *Alessandro nell'Indie* and *Artaserse*, both written by Metastasio. He was now engaged by Handel to supply the place of Senesino, who, together with his whole troop, except the Strada, had deserted from him, and enlisted under the banners of Porpora and the Barons, at Lincoln's-inn Fields. Carestini's person was tall, beautiful, and majestic. He was a very animated and intelligent actor, and having a considerable portion of enthusiasm in his composition, with a lively and inventive imagination, he rendered every thing he sung interesting, by good taste, energy, and judicious embellishments. He manifested great agility in the execution of difficult divisions from the chest in a most articulate and admirable manner. It was the opinion of Hasse, as well as of many other eminent professors, that whoever had not heard Carestini was unacquainted with the most perfect style of singing. He continued in the highest reputation for twenty years after quitting England, and sung at Berlin with the *Astrua* in 1750, 1754, and 1755. This admirable performer was here but two seasons, when he had the Strada as first woman for his partner. He performed in Handel's two best operas, *Ariadne* and *Alcina*, the first year against Senesino and Cuzzoni, who were joined; the second year against Farinelli. But several excellent judges, who had frequently heard him, and with whom we conversed many years after his departure, never spoke of his grand style of singing, fine figure, and dignified action, without rapture; among these, Hasse, who had often composed for him, and Quantz, who

who heard him at every period of his fame, were his greatest panegyrists.

CARESUS, in *Ancient Geography*, a town of Asia, in the country called Carefena. It was separated from the Granicus to the north-west by a small chain of mountains. Strabo.

CARET, in *Geography*, a town of Germany, in the Tyrolese; 12 miles S.W. of Bolzano.

CARET, a small bay in the gulf of Darien, which has two islands before it that are moderately high, and covered with trees.

CARET, in *Grammar*, a character in this form (Λ) denoting that there is something inserted or interlined, which should regularly have come in where the character is placed. This mark is also called a circumflex, when placed over some vowel of a word, to denote a long syllable; as "Euphrates."

CARET, in *Zoology*, synonymous with CARETTA, which see.

CARETTA, in *Geography*, a small low island, about $\frac{1}{2}$ of a league from the main, lying on the coast of Peru, in the Southern Pacific Ocean, 3 leagues from the cape of Cangallan, or St. Gallan.

CARETTA, in *Zoology*. See TESTUDO caretta. Caretta is sometimes applied to the species *Testudo imbricata*, Kuorr, &c.

CARETTA, in *Botany*, Rheed. Mal. ii. tab. 22. See GUILLANDINA bonducella.

CAREW, GEORGE, in *Biography*, earl of Totness, the descendant of an ancient family in the west of England, which came over probably from France with William the Conqueror, and originally derived this name from Carewcastle, in Pembrokeshire, was born in 1557. At the age of 15 he was admitted a gentleman commoner in the university of Oxford, where he made a good proficiency in learning, particularly in the study of antiquities; but being inclined to a military life, he went to Ireland, and served against the earl of Desmond. Having successively occupied several important posts, and commanded abroad in the expedition against Cadiz, in 1596, he was appointed president of Munster, in 1599, and in the following year treasurer of the army, and one of the lords-judices of Ireland. When he was advanced to the office of governor, he found the country in a state of open rebellion; and yet by his prudence and valour he succeeded, with a small force, in reducing it to the queen's obedience, and in counteracting the hostile designs of the Spaniards, who landed at Kinfal, in 1601. Having settled the province in a firm and universal peace, he obtained permission to resign his office in the beginning of the year 1603, and arrived in England three days before queen Elizabeth's death. Upon the accession of king James he was particularly noticed, and advanced to several posts of honour, and, in 1605, created a baron, by the title of lord Carew of Clopton in Warwickshire, as he had married the daughter and heiress of William Clopton, esq. When the crown devolved on Charles I. he was created, in 1625, earl of Totness. Having established the character of a faithful subject, a wise and valiant commander, an honest counsellor, a good scholar, and a patron of learning, he closed his life at the Savoy, in London, in 1629, and was buried at Stratford-upon-Avon, near Clopton, whence he took his first title. After his death his natural son, Thomas Stafford, published, in 1633, a work written under his direction, and entitled "Pacata Hibernia;" or The History of the Wars in Ireland, particularly within the Province of Munster, during the Years of his Government, fol. illustrated with 17 maps. In the Bodleian library are also four large

volumes of chronologies, charters, &c. relating to Ireland, which were collected by sir George Carew: and his materials for writing "The History of the Reign of King Henry V." are inserted in Speed's Chronicle. Biog. Brit.

CAREW, THOMAS, an English poet of the 17th century, belonged to the family of the Carews in Gloucestershire, which originally descended from that of Devonshire. Having been educated in the university of Oxford, and farther improved himself by travelling, he was honourably received at court, and much respected for his polite and elegant accomplishments. Charles I. appointed him gentleman of the privy chamber, and sewer in ordinary; and by Ben Jonson, sir William Davenant, and other poets of that period, his abilities and performances were extravagantly admired and applauded. It redounds, however, much more to his praise, that he was intimate in his youth with the great earl of Clarendon, who speaks highly of his amiable qualities, and of his talents for light poetry of the amorous kind, in the elegance and fancy of which he had few equals. From him also we learn, that Carew, after passing 50 years of his life in a careless and licentious manner, died (about the year 1639) with sentiments of penitential remorse and unfeigned respect for Christianity. He left behind him several poems, which have been frequently reprinted, and a masque, entitled, "Caelum Britannicum." Biog. Brit.

CAREW, RICHARD, was a descendant of the Cornish branch of the Carew family, and born in 1555. After spending three years in the university of Oxford, and about the same time in the Middle Temple, he travelled into foreign parts: and upon his return settled in his native county. The only original work written by him, if we except "The true and ready way to learn the Latin tongue," which is ascribed to him, was his "Survey of Cornwall," published in 4to. at London, in 1602. This work, which is much commended by Camden, has been since in a great degree superceded by Dr. Borlase's excellent publications relative to the county of Cornwall. Mr. Carew was held in high estimation for his talents and learning by several of the most eminent scholars of his time; and particularly by sir Henry Spelman, who extols him for his ingenuity, virtue, and learning. He died in 1620. Biog. Brit.

CAREW, GEORGE, brother of the preceding, was educated at Oxford, studied the law in the inns of court, and then travelled to foreign countries. On his return, he was called to the bar, and enjoyed some posts of honour and profit. Queen Elizabeth conferred upon him the honour of knighthood; and he was employed at home in treating with the Scotch concerning an union between the two kingdoms, and abroad in foreign embassies, first to Poland and afterwards to France. During his residence in the latter country, he formed an acquaintance with several literary persons, and particularly with Thuanus, to whom he communicated hints relating to Poland, which were of use to that excellent author in compiling part of his history. After his return from his French embassy in 1609, he drew up, for the use of James I., a perspicuous "Relation of the State of France, with the Characters of Henry IV. and the principal persons of that Court," which valuable tract was communicated, in MS., by the earl of Hardwicke, to Dr. Birch, who published it in 1749, at the close of his "Historical View of the Negotiations between the Courts of England, France, and Brussels, from the year 1592 to 1617." This intelligent writer commends it as a model upon which ambassadors may form and digest their notions and representations; and Mr. Gray also represents it as an excellent performance. From a letter written by Thuanus to Camden,

C A R E X.

in the spring of the year 1613, it appears that he was then lately deceased. Biog. Brit.

CAREX, in *Botany*, (derivation uncertain, supposed by some from the Greek verb, *καίω*, *tondeo*, *abscindo*, in allusion to the sharp edges of the triangular stem, and agreeably to the character given of it by Virgil,

"Frondebis hirsutis, et carice pascus acuta," Georg. iii. 231. Professor Martyn derives it, but, we think, with less probability, from *careo*, not *quia viribus careat*, but because, from its roughness, it is fit *ad carendum*, to card, teaze, or pull.) Linn. Gen. 1046. Schreb. 1407. Gært. 17. Juss. p. 26 Vent. vol. ii. p. 91. Laiche, Lam. Encyc. Class and order, *monocia triandria*. Nat. ord. *calamaria*, Linn. *Cyperoidea*, Juss.

Gen. Char. *Flowers* disposed in one or more oblong, imbricated catkins; the male and female in some species on the same, in others on distinct catkins. Male. *Cal.* glume one-valved, one-flowered, lanceolate, acute, concave, permanent. *Cor.* none. *Stam.* filaments three, bristle shaped, erect, longer than the calyx; anthers erect, long, linear. Female. *Cal.* as in the male. *Cor.* petals none; nectary inflated, oblong-egg-shaped, contracted upwards, opening at the tip, sometimes with two teeth, permanent. *Pist.* germ three-sided, within the nectary; style simple; stigmas either three or two, awl-shaped, incurved, long, acuminate, pubescent. *Peric.* none, except the enlarged nectary which protects the seed. *Seeds* single, acutely egg-shaped, most frequently three-sided, one angle often less than the other.

Ess. Char. Seed inclosed in the permanent nectary.

An admirable monograph of the British species has been published by the Rev. Dr. Goodenough, in the Transactions of the Linnæan Society, of which we have gratefully availed ourselves. Mr. Wahlenberg, of Upsal, has also written an excellent monograph of the genus published in "Kongl. Vetenskaps Academiens Nya Handlingar För Aprilis, Majus Junius, 1803," and republished in the fourth number of the Annals of Botany. We had made our arrangement, and drawn up the article before this work fell into our hands, but have since inserted all his new species, with such additions to the others as seemed important. From him we have also borrowed the references to the coloured figures, published by Mr. Schkuhr of Wittenburg.

Of the earlier modern botanists Lonicer appears to be nearly the only one who retained the term *carex*, and used it in its ancient acceptation. It was not employed either by Tournefort or Ray. Tournefort united several species under the vague appellation of *cyperoides*; one or two of which, if rightly understood, have both male and female flowers on the same spike; but his generic character comprehends those only which have them in separate spikes. Ray has adopted a still more exceptionable name, *gramen cyperoides*; and has been justly accused by Dr. Goodenough of including *cyperus* under it, and thus "making the thing likened include and refer to itself for its original;" but in justice to our great countryman it ought to be added, that though, in the introduction to the genus, as it stands in his Synopsis, he has, perhaps, inadvertently made *cyperus* one of the divisions of his *gramen cyperoides*, in the subsequent nomenclature of species he has carefully kept them distinct. We may observe, by the way, that this impropriety is of frequent occurrence in the writings of Jussieu and other French botanists.

About the beginning of the last century, Micheli and some others applied the term *carex* to those species, which have male and female flowers on the same spike, calling the others, either *cyperoides* or *scirpoides*. Linnæus extended it to both, and formed the preceding generic character, so

which, as to its substance, all subsequent authors have acceded. Dr. Goodenough, indeed, doubts whether the two families may not be advantageously again divided; but with due deference to this excellent naturalist, whose name must always carry with it a great weight of authority, as Linnæus's generic character is clear and definite, and especially as the two families sometimes run a little one into the other, it is surely more conducive to scientific precision to keep them together; and the ease of the investigating student is quite as well consulted, by making them subdivisions of one large genus.

A great diversity of opinions has prevailed with respect to the proper appellation of that part, which Linnæus has called the nectary. Tournefort calls it a vesicle, which afterwards becomes a capsule. Ray does not appear to have noticed it. Linnæus himself, when he speaks of it in an advanced state, sometimes calls it a tunic; but more generally, though in defiance of his own definition, a capsule. Gartner, in the first volume of his great work, "*de fructibus et seminibus plantarum*," calls it a coriaceous nut, formed of the indurated corolla, observing that it is not a true pericarp, but a mere involucre of the seed, since it permits the pistil to pass freely through it, which is contrary to the nature of a pericarp. If this eminent carpologist had lived to publish a second edition of his work, he would probably have called it an angidion. See the preface to the second volume, p. 32. La Marck, regarding only the form, calls it, not unaptly, though not very scientifically, an urceole. Dr. Smith, in several parts of his English botany, had expressed an inclination to consider this puzzling appendage to a very simple flower, as a true permanent corolla, which gradually hardens, and finally becomes an envelope of the ripened seed; but afterwards, in consequence of suggestion from Dr. Goodenough, supported by his own deliberate judgment, was induced to call it an aril, "as a name much better expressing its true nature than the hypothetical one of nectary, the erroneous one of capsule, or even the analogical denomination of corolla." As such it is described in his *Flora Britannica*. See also the fifth volume of the Transactions of the Linnæan Society, p. 265. It may be proper to add, that in the third volume of the same Transactions there is a paper by Dr. Goodenough, in which he intimates a belief, that all carices dispose of their seeds by the opening of the point of what he there calls the capsule; and as this opening is observed in some very early, and in others not till they are quite old, in the former case it has been described as opening, and in the latter as quite closed. In a very recent number of the English botany, Dr. Smith still continues to call it a tunic, a term which as it leaves the matter *adhuc sub judice*, we shall employ in the following descriptions, in all cases where we do not use the more general term, fruit.

In dividing the genus into sections, Linnæus separated those which have sessile from those which have peduncled female spikes. Dr. Goodenough observes, that this has been a source of great perplexity; for cultivation, or in a natural state a luxurious growth, does away the whole distinction. The peduncle, moreover, is often or in a great degree concealed by the sheath of the foliaceous bractæ. Thus *C. distans* always has its spikes on long peduncles, but as they are embraced by the sheaths, Linnæus styled them nearly sessile. Dr. Goodenough has therefore proposed a new mark of distinction, founded on the proportion which the peduncle bears to the sheath, and which is the same under every variation of soil and cultivation. If the sheath be of the same length as the peduncle, he calls it *vagina æquans*; if half the length, *dimidiata*; if about a quarter, *abbreviata*.

Species. * *Spike single, simple.*

1. *C. dioica*, Linn. Sp. Pl. Mart. 1. Lam. 1. Wahlen. 1. Eng. bot. tab. 543. Flor. dan. 369. Schkuhr 1. tab. A. Q. W. fig. 1. 2. (*C. lævis*; Hoppe. Masc. Gramen cyperoides, spica simplicia casta; Rai Syn. Ed. 2. 267. Gramen cyper. minimum spica casta simp. Inorie. §. 8. tab. 12. fig. 22. Fam. Gram. cyper. ranunculi capitulo rotundo; Rai Syn. 425. Cyperoides, Mich. gen. 56. tab. 32. f. 2. β. Gram. Cyp. capitulo longiore; Rai Syn. 425.) "Spike simple, dioicous; fruit egg-shaped, ribbed, ascending, finely ferrated at the edges." *Root* perennial, creeping. *Stems* from four to ten inches high, simple, triangular, smooth, leafy below. *Leaves* bristle-shaped, somewhat triangular, channelled within, a little shorter than the stem, sheathing. *Spikes* scarcely an inch long, linear, erect, many-flowered; glumes with a greenish nerve at the back, membranous at the edge, those of the female spike broader; stamens capillary, exserted; anthers yellow, linear. *Fruit* egg-shaped, gibbous and ribbed on the outside, finely ferrated near the tip, membranous and entire at the orifice, finally a little spreading; stigmas two, linear, pubescent. *Seeds* lenticular, smooth, yellowish, somewhat beaked. We have specimens of var. β. gathered near Leeds with a single female flower at the bottom of the male spike. A native of wet, spongy meadows in England, France, and other parts of Europe, flowering in May and June. 2. *C. Davalliana*. Smith in Transactions of the Linnæan Society, vol. v. p. 266. Flor. Brit. n. 2. Schkuhr tab. A. fig. 2. (*C. dioica*. Willd. Car. Berol. 16. *C. dioica*. β. Wahlen. C. n. 1350. Hall. Hist. v. 2. 182. Gramen cyperoides, spica simplici casta; Scheuch. Agr. 497. tab. 11. f. 9. 10. excluding all the synonyms.) "Spike simple, dioicous; fruit triangular-lanceolate, ribbed, spreading, deflexed; angles near the tip rough." *Root* perennial, fibrous, forming a turf. *Stems* a little higher than those of *C. dioica*, simple, triangular, rough, leafy at the base. *Leaves* bristle-shaped, triangular, three times shorter than the stem. *Spike* linear, upright, many-flowered; glumes brown, keeled, acute, membranous at the edge; stamens as in *C. dioica*. *Fruit* lanceolate-triangular, not egg-shaped, not gibbous, beaked, more strongly ribbed, and on both sides, rough near the tip at the angles, membranous and entire at the orifice, finally spreading in a deflexed direction, acuminate, so as to render the spike squarrous; stigmas two. Sent to Dr. Smith and Dr. Goodenough from Switzerland by Mr. Davall; discovered in Mearnsfere by professor James Beattie jun. of Aberdeen, and on Lansdown-hill near Bath by Mr. Grouet and Mr. Lambert. 3. *C. capitata*, Linn. Sp. Pl. 2. Mart. 2. Lam. 2. Flor. dan. 372. Wahlen. 2. Schkuhr 2. tab. Y. fig. 80. "Spike simple, egg-shaped, bearing both male and female flowers, the male ones above; fruit neither ferrated nor rough at the edges, scarcely nerved, imbricated, spreading." *Root* perennial. *Glumes* scarcely green at the back. Linn. "Spike somewhat globular; male flowers at the top; stigmas two; fruit circinate-ovate, a little convex on one side, flat on the other, quite smooth and even, slender, obtuse at the edges; leaves filiform." Wahlen. A native of Lapland, but not of Great Britain, as Linnæus supposed. 4. *C. leptalea*, Wahlen. 3. (*C. polytrichoides*; Willd. MSS.) "Spike with few and rather scattered flowers; stigmas two; fruit oblong-elliptical, emarginate; leaves very narrow." A native of North America. 5. *C. pulicaris*, Linn. Sp. Pl. 3. Mart. 3. Lam. 3. Leers tab. 14. fig. 1. Flor. dan. 166. Eng. bot. 1051. Schkuhr 3. tab. A. fig. 3. (*C. psyllophora*; Linn. jun. Supp. 413. Ehrh. Phyt. n. 7.) Wahlen. 4. *C. minima*, capulis deorsum deflexis; Mich. gen. 66. tab. 33. fig. 1.)

"Spike simple, with both male and female flowers; upper ones male; fruit divaricated, reflexed, tapering at both ends; stigmas two." *Root* perennial, fibrous, not creeping as in *C. dioica*. *Stems* often a foot high, simple, slender, smooth, leafy near the base. *Leaves* bristle-shaped, in tufts, rigid, smooth, channelled, nerved, nearly as long as the stems. *Spike* linear, erect, at first resembling that of *C. dioica*, in which state it is figured in Flora danica. *Male flowers*, numerous; glumes brown, finally pressed close; female loosely imbricated, finally reflexed; glumes deciduous, being forced off by the bending back of the ripening germ. *Fruit* elliptical-lanceolate, sharp-edged on each side, slightly cloven at the tip, without ribs, of a polished brown colour, somewhat resembling that of a flea, whence the trivial name; stigmas two. *Seed* elliptical brown. A native of marshy ground in England and other parts of Europe, flowering in June. 6. *C. obtusata*, Wahlen. 5. Liljeblad A&S. Stockh. 1793, tab. 4. "Spike of about four flowers; stigmas three; fruit inversely egg-shaped, inclining to globular, somewhat coriaceous, patent-diverging; orifice transparent, two-lobed; leaves very narrow." A native of Sweden in dry gravelly soil. 7. *C. petraea*, Wahlen. 6. "Spike with numerous male flowers at the top, three scattered female ones at the base; stigmas three; glumes somewhat circinate, large, very brittle; fruit top-shaped, very slender, erect; stem acutely angular. A native of rocky mountains in the north of Lapland. 8. *C. pyrendica*, Wahlen. 7. "Spike many-flowered, dense; female flowers numerous; stigmas three; fruit narrow-oblong, with a short beak, diverging." A native of the Pyrenæes. 9. *C. pauciflora*, Mart. 45. Lightfoot Flor. Scot. tab. 6. fig. 2. Smith Flor. Brit. n. 4. Schkuhr 4. tab. A. fig. 4. (*C. patula*; Hudf. 402 and 657. *C. leucoglochis*; Linn. jun. Supp. 413. Ehrh. Phyt. n. 8. Mart. 52. Wahlen. 8.) "Spike simple, with few flowers; fruit spreading, awl-shaped; stigmas three." *Root* perennial, creeping. *Stems* from three to five inches high, ascending, smooth, obscurely triangular. *Leaves* generally two, even, channelled, about half the length of the stem. *Spike* loose; flowers from four to six; terminal; one of them male, erect; the rest female, spreading, finally bent down. *Fruit* somewhat triangular, furrowed; stigmas three. According to Lightfoot there are sometimes only two. A rather rare native of alpine marshes in Scotland, flowering in June. In the north of Sweden common. 10. *C. squarrosa*, Linn. Sp. Pl. 4. Mart. 4. Lam. 4. "Spike simple, with male and female flowers, cylindrical; lower flowers male; fruit imbricated, horizontal." *Spike* thick. *Fruit* with a long linear beak. One of the largest species in the genus. Linn. A native of Canada, Kalm. 11. *C. humata*, Mart. 46. Wahlen. 10. Swartz. Prod. 18. (*C. uncinata*; Schkuhr 7. tab. G. fig. 30. *C. phleoides*; Cavanilles Icon. vol. 5. p. 40. tab. 464. fig. 1.) "Spike rather long, male flowers at the top; stigmas three; glumes oval, as long as the fruit, obvolvate; fruit oblong, obtuse, convex on one side, a little concave on the other, ciliated, with a long and hooked awn." Wahlen. A native of mountains in Jamaica; Swartz. Chili, Cav. Isle of France. Grondal. 12. *C. uncinata*, Linn. jun. Sup. Mart. 5. and 53. Lam. 6. Wahlen. 11. "Spike very long, thickened above; male flowers at the top, stigmas three; glumes adnate, oblong, shortish; fruit oblong, with a short and roundish beak, and a rather long, hooked awn." Wahlen. The most beautiful species in the genus. *Female flowers* occupying two thirds of the spike; awn curved above the middle, thickened at the joint. Small spikelets sometimes hang down at the side, which are perhaps barren. Linn. jun. A native of New Zealand. Forst. 13. *C. eri-*

nacea, Wahlen. 12. Cavanilles Icon. vol. 5. p. 40. tab. 464. fig. 2. "Spike linear, shortish; male flowers at the top, stigmas three; glumes somewhat circinate, rather large; fruit roundish-egg-shaped, triangular; awn very long, hooked. A native of the west coast of south America. 14. *C. rupestris*, Mart. 47. Allion. Pedem. 2292. tab. 92. fig. 1. "Spike oblong, male flowers at the top; female glumes awned." Stem scarcely four inches high, naked, triangular, twice as long as the leaves. Spike an inch long; male glumes somewhat egg-shaped, not awned; female broad, egg-shaped, acute, bay-coloured, with a paler edge, and a broadish nerve ending in an awn. A native of Piedmont.

* * Spike compound. Male and female flowers on the same spikelet.

15. *C. Bellardi*, Mart. 48. Wahlen. 15. Allion. Ped. 2293. tab. 92. fig. 2. Schkuhr 25. tab. D and H h, fig. 17. (*C. myosuroides*; Villars Dauph. 2. 194. tab. 6?) "Spike somewhat compound, linear; spikelets of two flowers, upper one male; lower female, with three stigmas; glumes somewhat circinate, large, very brittle; fruit top-shaped, slender; stem round; leaves filiform." Wahlen. Root fibrous. Stems numerous, about seven inches high, striated, somewhat curved. Leaves convoluted, striated, somewhat curved, about the height of the stem. Spike about an inch long; flowers generally solitary, alternate, sessile; so that the spike seems to be interrupted; glumes egg-shaped, acute, without awns, bay with a whitish edge. Allion. A native of Piedmont. Although these two authors do not exactly agree in their manner of describing the inflorescence, the difference seems to be only verbal. The *myosuroides* of Villars, which he suspects may be the same plant, and which he says has hermaphrodite flowers and half naked seeds, must be distinct, and if his description be exact, is scarcely a *Carex*. 16. *C. capensis*, Wahlen. 14. Thunb. "Spikelets male at the top, somewhat compound, near together; stigmas three; fruit oblong, acute, convex on both sides, obtusely angular, a little curved outwards, bractes somewhat foliaceous, stem round. 17. *C. cyperoides*, Linn. jun. Suppl. 433. Mart. 6. and 54. Lam. 5. Wahlen. 35? Schkuhr 28. tab. A. fig. 5? (*C. bohémica*; Schreb. gram. tab. 28. fig. 3. Mich. gen. p. 70. tab. 33. fig. 19. *Cyperus minor*, capitulis inflexis; Buxb. Cent. 4. p. 34. tab. 61. *Scirpus pica multipartita*, seminibus cordatis; Gmel. sib. v. 1. p. 81.) "Head terminal, roundish; flowers absolutely simple, awl-shaped, involucre long." Flowers absolutely simple, (which is singular), pedicelled, forming a simple umbel, Linn. jun. La Marck adopts all the younger Linnaeus's synonyms; but gives the following description, which appears to be taken from Schreber, resembling *Cyperus* in its general habit and involucre, and *Scirpus* in the disposition of its flowers. Root perennial. Stems about a foot high, triangular, sheathed in their lower part with a few gramineous, narrow leaves. Head round, terminal, composed of numerous close spikelets. Flowers on the outside of each spikelet male, on the inside female; stamens white; pistil longer than the tunic; style bifid. Involucre four-leaved. Martyn inadvertently gives it twice, with precisely the same synonyms to both, but annexes Schreber's description to n. 6. and the younger Linnaeus's to n. 54. If they really belong to the same species, Linnaeus's plant must be a very singular variety with one-flowered spikelets, for such the pedicel determines them to be; it proves also that the species, whether one or two, ought not to be placed in the first section. Wahlenberg gives the following specific character of his *cyperoides*; "spikelets male at the base, forming a head; glumes linear-bristle-shaped; fruit bicuspidate; bractes close together, foliaceous, long." A native of Bo-

hemia, the Levant and Siberia. 18. *C. curvula*, Mart. 49. Lam. 10. Wahlen. 16. Hall. helv. n. 1353. Allion. pedem. n. 2295. tab. 92. fig. 3. Schkuhr 25. tab. D and H h, fig. 17. "Stem and leaves rigid, curved; spike single; glumes awned." Root perennial. Stems slender, naked, scarcely longer than the leaves. Leaves narrow, rush-like, three or four inches long, a little curved. Spike short, apparently simple, but composed of two or three clustered spikelets. Glumes lanceolate, acute, reddish, membranous, and whitish at the edges. A native of high mountains in Switzerland, Dauphiny and Piedmont. 19. *C. incurva*, Mart. 57. Lightfoot Flor. Scot. 544. tab. 24. Smith Flor. Brit. 10. Goodenough 9. Wahlen. 19. Schkuhr 19. tab. H h, fig. 25. (*C. juncifolia*; Allion. pedem. 2296. tab. 92. fig. 4. Flor. Dan. 432?) "Spikelets clustered in a head; lower flowers female, bractes membranous; stem roundish, smooth; leaves channelled." Dr. Smith. Very nearly allied to the preceding, if it be more than a variety. Root perennial. Stems three inches long, ascending, naked, even, on the sea-shore curved, on moist mountains often straight. Leaves shorter than the stem, linear, channelled, even, nerved. Spike compound, short, nearly conic when in flower, obtuse when in seed; spikelets roundish, few-flowered, brownish. Bractes shorter than the spikelets, partly embracing the stem, concave, elliptical, obtuse, slightly keeled. Glumes egg-shaped, brown, white at the edges, with a very slender keel. Fruit egg-shaped, acute, green, brown at the tip, undivided, smooth at the edges. Stamens capillary, very long, white. Stigmas two, brown. Seed lenticular. Lightfoot describes his plant as having no involucre and such it appears in his figure. Dr. Smith attributes to it two bractes which are represented very distinctly in Mr. Sowerby's figure in English botany. Dr. Goodenough was honoured with a sight of Lightfoot's original specimen in her majesty's herbarium, but fearful of doing any injury by handling it, forebore taking a minute description. We are doubtful of the figure in Flora Danica, though quoted both by Dr. Goodenough and Dr. Smith. It appears to differ not only in habit, but also in the structure of the pistil. If it be our plant it is taken in an advanced state of fructification, and without the bractes. It seems probable that the latter may be generally pushed off by the ripening fruit. Specimens of this plant were sent to Dr. Hope from the deep, loose sand at the mouth of the water of Naver, and from the neighbourhood of Skelberry in Dunrosshaes in Shetland. Dr. Smith received others from Professor Beattie, gathered near Aberdeen. It flowers in July and August. 20. *C. fœtida*, Mart. 50. Lam. 7. Wahlen. 20. Allion. Flor. ped. 2297. Hall. helv. 1355. Scheuch. gram. 495. Prodr. tab. 4. It. p. 458. fig. 11. Villars Dauph. 2. 195. "Spike compound, egg shaped, brown; spikelets clustered." Lam. Root perennial. Stem naked, triangular, often a little curved, about the length of the largest leaves. Leaves about three inches long, near two lines broad, tufted, grass-like, keeled. Spike short, a little conical, brown or blackish, naked at its base; spikelets ten or twelve, egg-shaped, acute, blunt, forming a regular cluster. Sometimes there are two long, tailed leaves under the spike, sometimes only one, and sometimes none. According to Haller the plant has an unpleasant smell, both green and dry. A native of boggy ground on mountains in Switzerland, Dauphiny and Piedmont. La Marck considers the *juncifolia* and *fœtida* of Allioni as the same plant, and quotes *C. incurva* of Lightfoot as a synonym; but Dr. Smith, who gathered both on the hill called Rouche near Mount Cenis, has determined them to be perfectly distinct, and the *juncifolia* to be Lightfoot's *incurva*, though on the Alps it is seldom curved. Wahlenberg, on

the other hand, makes all the three distinct species, and gives the following specific characters of the *juncifolia* and *incurva*.

21. *C. juncifolia*, n. 17. "Spikelets sessile, male at the top, collected into a small oblong head; fruit rather roundish-depressed, attenuated; orifice two-lobed, stigmas two; stem round, incurved; leaves convolute; inner ones very short." *C. incurva*, n. 19. "Spikelets sessile, male at the top, densely collected into an ovate-globular head, few, somewhat diverging; fruit circinate-ovate, semiglobular, beaked; orifice very entire; stigmas two; stem rather acutely angular, somewhat incurved; leaves convolute." 22. *C. simplicifolia*, Wahlen. 18. (*Schœnus monoicus*; Eng. bot. 1410?) "Spikelets sessile, male at the top, clustered into a linear spike; fruit oblong, depressed, slightly beaked; orifice very entire; stigmas two; leaves very narrow, convolute." A native of Westmoreland in England, sent to Swartz by Mr. (doubtless Dawson) Turner. From this circumstance, added to its not being mentioned by any British botanist, we think it almost certain that this plant is no other than *Schœnus monoicus* of English botany, which remained for some time undetermined, and as Dr. Smith observes, was taken by every body, even the able Mr. Schkuhr, for a *Carex*: but in that case Wahlenberg has greatly erred in describing the fructification. 23. *C. stenophylla*, Wahlen. 21. (*C. juncifolia*, Hoff. Schkuhr. Car. 18. tab. G. and I. fig. 32). "Spikelets sessile, male at the top, collected into an ovate head; fruit ventricose, roundish, rather flatly convex, ribbed, slightly serrated at the edge; orifice two-toothed; stigmas two; stem acutely angular; leaves very narrow." 24. *C. Baldensis*, Linn. Sp. 5. Mart. 7. Lam. 9. Wahlen. 13. Vill. Dauph. 2. 196. tab. 6. Schkuhr. tab. 4. fig. 81. (*C. alpina* seg. ver. 1. 125. n. 5. gram. juncum; Bauh. pin. 6. n. 12. prod. 13. tab. 13. Hist. 2. 509.) "Spikes egg-shaped, triangular, ternate, clustered, terminal, sessile; involucre two-leaved." Linn. Root perennial. One leaf of the involucre longer than the spikes, the other shorter. Spikelets three or four, collected into a head, white, oblong; glumes of the male flowers on the upper part of the spikelets lanceolate; of the female flowers gibbous; style long, three-cleft. Linn. Stem naked, triangular, at least seven inches high. Leaves all radical, rather narrow, half the length of the stem. Spikelets three, sessile, short, reddish brown or whitish, forming a kind of three-lobed spike. Seguir. A native of Mount Baldo and the neighbourhood of Verona. La Marck thinks it must be rare, neither Haller nor Allioni having described it, and he himself having never seen it, but conjectures that the following may be a variety of it without the involucre. 25. *C. tripartita*, Mart. 59. Allion. ped. n. 2298. tab. 92. fig. 5. Hall. helv. 1356. (*C. lobata*; Lam. 8. Wahlen. 23. Vill. Dauph. 2. 197. ?) "Spike compound, egg-shaped, somewhat lobed, ferruginous-brown; lower glumes mucronate." Lam. Root perennial. Stem triangular, naked, a little longer than the largest leaves. Leaves four or five inches long, two lines broad, tufted, gramineous, keeled. Spike short, naked at its base, commonly three-lobed; lateral, lobes very short; spikelets about twelve, sessile, male at the top, egg-shaped, clustered; stigmas two. A native of Switzerland, Dauphiny, and Piedmont. 26. *C. bipartita*, Mart. 60. Lam. 11. Allion. pedem. 2301. tab. 89. fig. 5. "Stem round, naked; spikes two, upper one compound, terminal." Root perennial, fibrous, throwing out several stems and leaves in a tuft. Stems four or five inches high, twice the length of the leaves, striated, cylindrical. Leaves gramineous, smooth, a little rolled in at their edges, striated, acute, almost pungent. Spikes two, upper one an inch long; spikelets sessile, alternate, clustered; lower one near the other, shorter, egg-

shaped, pedicelled; bracte reddish brown, acute; glumes egg-shaped, acute, not awned, brown, whitish at their edges as they grow old. Sometimes, but rarely there is a third spike beneath the other two. A native of spongy ground on the mountains of Piedmont. 27. *C. divisa*, Mart. 56. Goodenough 12. Smith 13. Linn. Soc. Transf. vol. ii. tab. 19. fig. 2. Wahlen. 27. Eng. bot. 1096. Schkuhr 11. tab. V v. fig. 61. (*C. hybrida*; Lam. 17. Gramen cyperoides ex monte Ballon. spicâ divulsâ; Rai Syn. 423.) "Spike once or twice compounded; bracte leafy, erect; fruit not spreading; root creeping." Root perennial, creeping horizontally to a considerable extent, black, strong, twisted. Stems a foot high and more, upright, weak, naked, triangular; angles roughish upwards. Leaves narrow, upright, bright green, rough at the edges and keel, various in length. Spike an inch long, egg-shaped, often doubly compound at the base, of a dark rusty colour, dense, rather compressed; spikelets several, irregularly clustered, egg-shaped, acute; female flowers lowest, most numerous, and flowering soonest, which, as Dr. Goodenough observes, occasions a considerable elongation of the styles waiting for their impregnation. Bracte at the base of the spike leafy, upright, acutely triangular, often very long, but sometimes shorter than the spike. Glumes elliptical, mucronate, brown, a little membranous at the edge; keel pale. Fruit shorter than the glume, egg-shaped, with a rough dilated margin, cloven at the point; stigmas two, brown, very long. A native of marshy ground, flowering in May and June. 28. *C. muricata*, Linn. Sp. Pl. 11. Mart. 13. Gooden. 13. Smith 14. Wahlen. 28. Schkuhr 13. tab. E. fig. 22. (*C. spicata*; Hudson With. 2d. Ed. Relh. Lightf. Sibth. *C. vulpina* β; Lam. *C. palustris* media; Mich. gen. 69. tab. 33. fig. 14. Gram. cyper. spicatum minus; Rai Syn. 424. Gram. fylv. Morif. 8. tab. 12. fig. 27. β. *G. cyperoides* spicis minoribus, minusque compactis; Scheuchz. Ag. 488. tab. 11. f. 5. γ. *C. loliacea*; Schkuhr 14. tab. E e. fig. 91. Suter. Flor. Helv. 18. capsulis subacutangulis.) "Spice oblong, once or twice compounded, prickly; fruit divaricated, pointed, cloven; root fibrous." Root perennial. Stem from a foot to a foot and half high, upright, straight, naked, except at the base, triangular, the angles rough upwards. Leaves bright green, narrow, often longer than the stem, rough on the edges and keel. Spike oblong, an inch long or more, cylindrical, obtuse, interrupted at the base, sometimes branched; spikelets eight or ten, sessile, roundish; male flowers uppermost. Bractes egg-shaped, membranous, keeled, the lowest tipped with a narrow, rough, leafy point; the lower ones longer than the spikelets, spreading. Glumes egg-shaped, membranous, mucronate, brown, with a green keel. Fruit divaricated, egg-shaped, convex on one side, green, at length brown, rough at the margin towards the top, deeply cloven at the point; stigmas two. A native of moist pastures, flowering in May and June. 29. *C. stellulata*, Mart. 63. Gooden. 4. Smith 5. (*C. muricata*, Hudf. Lightfoot. With. 2d. ed. Lam. 20. *C. cchinata*, Sibth. Gram. cyper. spicatum minimum, spicâ divulsâ aculeatâ, Rai Syn. 424.) "Spikelets three or four, remote; fruit divaricated, acuminate; beak not cloven." Root perennial, fibrous. Stem from six to twelve inches high, erect, straight, naked except at the base, triangular; angles roughish upwards. Leaves flat, keeled, shorter than the stem; nearly erect, and roughish towards their point, on the edges and keel. Spikelets sessile, alternate, roundish, nearly at equal distances, not very remote from each other; the lowest generally supported by a leafy bracte; male flowers beneath the female, and less numerous. Glumes egg-shaped, brown, membranous and white at the edges; keel broad,

broad, green. *Fruit* spreading in every direction, egg-shaped, ribbed, mucronate, scarcely emarginate, not cloven, roughish on each side; stigmas two. Common in wet, barren ground, flowering in May and June. All the English botanists took this for *C. muricata* of Linnæus, till the fortunate acquisition of the Linnæan museum by Dr. Smith set them right. It is remarkable that La Marck fell into the same mistake. Dr. Goodenough, indeed, supposes that Linnæus, and the Swedish botanists after him, confounded the two plants, notwithstanding the different position of the male and female flowers, a character which struck La Marck as a sufficient distinction between this species, (his *muricata*) and *vulpina*, though in other respects nearly allied. 30. *C. curta*, Mart. 64. Gooden. 5. Smith 4. Willd. Car. Berol. 19. tab. 2. fig. 3. Schkuhr. 33. tab. C. fig. 13. (*C. canescens*, Lightfoot. Flor. Dan. tab. 285. Lam. 21. ? *C. brizoides*, Hudf. *C. elongata*, Leers 197. tab. 14. fig. 7. Gr. cyper. elegans, Rai Syn. 423. n. 6. and 7. 3d. ed. Pluk. Phyt. tab. 34. fig. 4. Rcl. Rudb. 2. f. 34. G. cyper. spicis curvis divulsis. Loefel. Pruff. 117. tab. 32.) "Spikelets about six, elliptical, a little separate, naked; glumes egg-shaped, rather acute, membranous; tunic entire." Dr. Smith. *Root* perennial, rather creeping. *Stem* a foot high, triangular, smooth except in the upper part. *Leaves* linear, flattish upwards, narrow, somewhat glaucous, roughish, nearly as high as the stem. *Spikelets* from four to six, or more, sessile, generally alternate, elliptical, obtuse, many-flowered; the lowest sometimes but rarely furnished with a bracte; lower flowers male, fewer than the female. *Glumes* egg-shaped, membranous, remarkably tender; white, shining, with a slender green rib. *Fruit* egg-shaped, compressed, acute, smooth; stigmas two. *Seed* exactly elliptical. A native of watery places in England and Scotland and other parts of Europe, readily distinguished in a state of maturity by its silvery spikelets. 31. *C. canescens*, Linn. Sp. Pl. 16. Mart. 17. "Spikelets roundish, remote, sessile, obtuse; fruit egg-shaped, rather obtuse." Similar to *curta*; so much so that Loefel's figure referred by Dr. Goodenough and Dr. Smith to *curta*, is almost equally expressive of both; but when they are brought together, a wide difference presents itself. The *curta* is smaller in all its parts: its bractes, moreover, are silvery and very tender; whereas in the *canescens* they are membranous and hard, as in the rest of the genus, and are brown with a white edge, which gives it a real, hoary appearance. See Dr. Goodenough's remarks in Linn. Transf. vol. ii. p. 147. Wahlenberg, however, notwithstanding what has been advanced by Dr. Goodenough, unites the *curta* of that able botanist with the *canescens* of Linnæus, (at least of the flora suecica,) under the following specific character. "Spikelets five, male at the base, rather near together; glumes nearly as long as the fruit; fruit roundish-ovate, rather acute, convex on one side, less so on the other; angles rather obtuse; orifice two-toothed; stigmas two." 32. "upper spikelets aggregate; fruit spreading, acute, convex on one side, nearly flat on the other; angles rather acute." 32. *C. elongata*, Linn. Sp. Pl. 15. Wahlen. 41. Schkuhr tab. E. fig. 25. "Spikelets oblong, sessile, remote; fruit egg-shaped, acute." Linn. "Upper spikelets male at the base, rather near together, in a kind of raceme; rather densely flowered; glumes shortish; fruit oblong-acuminate, convex on both sides, obtusely angular, ribbed, curving a little outwards; orifice nearly entire; stigmas two." Wahlen. A native of Europe. 33. *C. loliacea*, Linn. Sp. Pl. 13. Wahlen. 47. Schkuhr tab. P p. 10. "Spikelets somewhat egg-shaped, roundish, sessile, remote; fruit egg-shaped, roundish, not awned, divaricated." *Root*

creeping. *Stem* even, naked towards the top. *Leaves* gramineous, tender, even. *Spikelets* from four to eight, small, scattered at the top of the stem, white. Similar to *C. muricata*, but differs in being only half the size, with fruit less divaricated, obtuse, not acute at the edges." Linn. "Spikelets three, male at the base, a little distant, few-flowered; glumes short; fruit somewhat oval-elliptical, rather convex on both sides, obtuse, obtusely angular, divaricated; orifice quite entire; stigmas two; bractes bristly; leaves very narrow." Wahlen. A native of Sweden. La Marck is assured that the last three are all one species, in which the *curta* of Dr. Goodenough is doubtless included. He even doubts whether the *stellulata*, his *muricata*, is sufficiently distinct. The last three are ranked by him under the specific name of *canescens* with the following character. "Spikelets egg-shaped, sessile, remote, nearly naked; fruit egg-shaped, acute, rather converging." He distinguishes two varieties; (α) the *elongata* of Linnæus and Leers. Scheuch. gram. 487. tab. 11. fig. 4. and probably Hall. helv. 1359. (β) the *canescens* of Linnæus and Pollich, and the *loliacea* of Linnæus. Rai hist. p. 1297. n. 10. Syn. 3d. ed. p. 424. n. 10. Loefel. Pruff. tab. 32. Hall. helv. 1359? He adds that Plukenet's tab. 34. fig. 4. appears to be taken from a plant of this species in an early state of the flower. 34. *C. virens*, Lam. 22. (*C. nemorosa*, Mich. gen. 69. n. 4. tab. 33. fig. 10. ? Gram. cyper. echinata minus. Barrel. ic. 20. n. 2.) "Spikelets egg-shaped, sessile, rather remote; the lowest furnished with a long bracteal leaf." Allied to La Marck's *canescens*, but sufficiently distinguished by the long bracteal leaf, as it is from *remota*, by having only one. *Root* perennial. *Stem* about a foot high, slender, triangular, leafy on the lower part. *Leaves* as long as the stem, about a line broad, green, striated, roughish at the edges. *Spike* one or two inches long, slender, a little interrupted in its lower part; spikelets from five to seven, sessile, alternate, oval, greenish. A native of moist ground in France. 35. *C. microstachya*, Wahlen. 42. Ehrhart. Schkuhr 31. tab. C. fig. 11. "Lateral spikelets female, few, crowded, minute; terminal one male at the base, three times the length of the others; glumes shortish; fruit ovate-acuminate, thin and somewhat membranous at the edges; stigmas two." A native of moist ground in the neighbourhood of Upsal. 36. *C. norvegica*, Wahlen. 43. Schkuhr 40. tab. S. fig. 56. "Spikelets four, male at the base, rather near together, oval-elliptical, turgid; fruit somewhat circinate, rather large, nearly orbicular, pointed, obtusely angular, thick; stigmas two; bractes cuspidate." A native of muddy shores in Norway. 37. *C. glareosa*, Wahlen. 44. Schkuhr tab. A a 2, fig. 97. "Spikelets three, rather crowded, oblong; terminal one male at the base; glumes as long as the fruit; fruit oblong, acuminate, very convex on one side, flat on the other, rather acutely angular, ribbed; stigmas two; leaves very narrow, inner one much the shortest; stem flaccid." A native of gravelly shores on the coast of Norway, and of the gulph of Bothnia. 38. *C. tenuifolia*, Wahlen. 48. "Spikelets three, male at the base, crowded, rather many-flowered; glumes nearly as long as the fruit; fruit broadly oblong-ovate, rather acute, convex on one side, nearly flat on the other; somewhat acutely angular, spreading; leaves very narrow. A native of Lapland in moist pastures. 39. *C. remotiuscula*, Wahlen. 50. "Spikelets about six, male at the base, somewhat remote, rather few-flowered; glumes shortish; fruit ovate-oblong, attenuated, convex on one side, flat on the other, acutely angular, spreading; orifice bifid; stigmas two; lower bractes foliaceous, long, very narrow." A native of Siberia, in the Herbarium of Swartz. 40. *C. remota*, Linn. Sp. Pl. 14. and

and axillaris, 12. Mart. 15. Lam. 23. Wahlen. 51. Eng. Bot. 832. Flor. Dan. 370. (*C. angustifolia* capitulis pulchellis, Mich. Gen. 70. n. 2, 3. tab. 33. fig. 15, 16. Gram. Cyp. Rai Syn. p. 424. n. 11. Pluk. Phyt. tab. 34. f. 3. Morif. §. 8. tab. 12. f. 17.) "Spikelets solitary, remote, nearly sessile; bractes very long, overtopping the stem; seed-tunic almost entire." Dr. Smith. *Root* perennial. *Stem* a foot high, slender, feeble, triangular, rough upwards, smooth and roundish at the base. *Leaves* narrow, pale green, rough at their edge. *Spikelets* alternate, solitary, egg-shaped, white, about six or eight; three or four of the lowest very distant; bractes gramineous; male flowers lowest; glumes broad-egg-shaped, membranous, white, with a green keel. *Fruit* egg-shaped, acuminate, longer than the glume, roughish at the edge in the upper part, generally entire at the orifice; stigmas two. *Seed* lenticular. A native of moist groves, and banks of ditches, in shady places, flowering in May and June. 41. *C. gibba*, Wahlen. 52. (*C. remota*, Thunb. Flor. Jaq.) "Spikelets male at the base; lower ones somewhat ternate, rather distant; glumes short; fruit somewhat lenticular, beaked, very convex on one side, a little so on the other, thin and entire at the edges; orifice two-toothed; stigmas two; bractes foliaceous, long, rather narrow; stem limber." A native of Japan. 42. *C. axillaris*, Mart. 12. Gooden. 8. Smith Flor. Brit. 9. Linn. Transf. v. 2. tab. 19. fig. 1. Wahlen. 53. Eng. Bot. 993. "Spike interrupted; lower spikelets in remote clusters; upper ones solitary, all sessile; bractes elongated; seed-tunic cloven." *Root* perennial, fibrous. *Stem* erect, strong, stiff, from one to three feet high, triangular; angles rough. *Leaves* shorter than the stem, rough at the edge, and near the tip of the keel. *Spikelets* more turgid than those of *C. remota*; the lowest bracte about the height of the stem; the others shorter; lower flowers male; glumes egg-shaped, acute, membranous, brownish, with a green keel. *Fruit* egg-shaped, acuminate, a little longer than the glume, rough at the edges near the tip; stigmas two. A native of wet ditch banks, flowering in June. The *axillaris* of Linnæus is nothing more than his *remota*, inserted through inadvertence with nearly all the same synonyms, and with no material difference in the specific character. Dr. Goodenough observes, that Buddle is the first who noticed this species, and distinguished it from the more common *remota*. A specimen is preserved in his Herbarium, p. 31. n. 6. It has been found since by Mr. Curtis near Putney, and by Mr. Woodward near Norfolk. 43. *C. chordoriza*, Linn. Jun. Sup. p. 414. Mart. 67. Wahlen. 22. Schkuhr 17. tab. G. fig. 31. Ehrh. Phytoph. 77. "Spikelets male at the base, rather close together; fruit semi-globular, woody, elongated at the base; stigmas two; lowest leaf very short; the other sheaths leafless; root slender, creeping." Wahlen. A native of Sweden. 44. *C. helconastes*, Linn. Jun. Sup. Mart. 68. Ehrh. Phytoph. n. 28. Wahlen. 45. Schkuhr. 42. tab. I. i. fig. 97. "Spikelets four, male at the base, crowded, somewhat globular; glumes nearly as long as the fruit; fruit egg-shaped, acute, convex on one side, a little so on the other, rather obtusely angular, spreading; stigmas two; stem stiff." A native of Sweden. 45. *C. ovalis*, Mart. 65. Gooden. 6. Smith Flor. Brit. 7. Eng. Bot. 306. (*C. leporina*, Hudf. Relh. Sibth. Lam. 16. Leers. t. 14. f. 6. Ehrh. Phyt. n. 38. Gram. cyper. spica e pluribus spicis, &c. n. 2. Scheuchz. tab. 10. fig. 19. Morif. tab. 12. fig. 29.) "Spikelets about six, oval, near together, alternate; glumes lanceolate, as long as the fruit." *Root* perennial, creeping. *Stem* a foot high or more, erect, acutely triangular, rough at the angles, leafy at the base. *Leaves* deep green, flat, keeled, nearly as long as the stem, and sheathing its lower part, alternate, roughish on the edge and keel. *Spikelets* from

four to six, of a rusty green colour, elliptical; bractes at the base of each spikelet lanceolate; the lower one longer than the rest, and ending in a leafy point; male flowers inferior, few; females numerous; glumes egg-lanceolate, acute, membranous at the edge, with a green keel. *Fruit* lanceolate, acuminate, convex on one side, nearly entire at the orifice, rough at the edge; stigmas two. *Seed* roundish, elliptical. Dr. Smith. Common in wet marshy pastures, flowering in June. 46. *C. leporina*, Linn. Sp. Pl. 8. Wahlen. 35. "Spike compound; spikelets egg-shaped, sessile, near together, alternate, naked." Linnæus, as appears from his references to Morison and Scheuchzer, confounded this species with the preceding. It is, however, as Dr. Goodenough observes, perfectly distinct. The specimen in Linnæus's herbarium, now in Dr. Smith's possession, is a smaller plant, with only three nearly globular spikelets, blunter and shorter glumes, and fruit entirely smooth. It is a native of the highest Alps. Wahlenberg nevertheless still considers the *leporina* of Linnæus, and the *ovalis* of Goodenough, as one and the same plant. 47. *C. divulsa*, Mart. 58. Gooden. 14. Smith Flor. Brit. 15. Schkuhr 12. tab. Ww. fig. 89. Eng. Bot. tab. 629? (*C. canescens*, Hudf. α . *C. muricata*; β . Wahlen. 28. *C. nemorosa* spica longâ divulsâ, &c. Mich. Gen. 69. tab. 33. fig. 10. Gram. Cyp. spica longa divulsa, Rai Syn. p. 424. n. 11.) "Spike elongated, twice compounded, often branched at the base; lower spikelets remote; fruit nearly erect, nearly smooth at the edge." *Root* perennial, fibrous. *Stem* a foot high or more, weak, somewhat reclining, naked, acutely triangular; angles rough, especially near the tip. *Leaves* narrow, longer than the stem; edge and keel rough. *Spike* interrupted in its lower part, pale green; lower spikelets remote, sometimes in pairs; the lowest often compound; bractes small, broad-egg-shaped, sharply keeled, ending in a rough bristle-shaped leaflet, often longer than the spikelet; upper flowers male; glumes egg-shaped, acute, white; lower ones generally with a green keel. *Fruit* egg-shaped, convex on one side, without ribs, smooth, white, green at the tip, cloven, rough only at the tip; stigmas two. *Seed* orbicular, compressed. A native of moist woods, flowering in May. 48. *C. Schreberi*, Wahlen. 36. Willd. Schkuhr 30. tab. B, fig. 9. "Spikelets five, male at the base, somewhat clustered; glumes as long as the fruit; fruit oval-ovate, rather acute, a little convex, rather acutely angular; orifice emarginate; leaves very narrow; root creeping." A native of sandy soil near Berlin. 49. *C. lagopina*, Wahlen. 37. (*C. leporina*, Fl. Dan. tab. 294. Approximata, Hoppe Herb.) "Spikelets three, male at the base, clustered; glumes rather small; fruit somewhat circinate, acute, somewhat beaked, convex on one side, a little concave on the other, obtuse and quite entire at the edges; orifice two-lipped; stigmas two." A native of the Lapland mountains. 50. *C. straminea*, Wahlen. 38. Willd. Schkuhr 38. tab. G. fig. 34. "Spikelets five, male at the base, a little distant, somewhat globular; glumes lanceolate, as long as the fruit; fruit roundish-inversely egg-shaped, beaked, membranous at the edges; orifice bifid; stigmas two." A native of North America. 51. *C. vulpina*, Linn. Sp. Pl. 10. Mart. 11. Lam. 19. Gooden. 15. Smith 16. Eng. Bot. 307. Leers, tab. 14. fig. 5. Flor. Dan. tab. 308. Wahlen. 29. Schkuhr. 10. tab. C. fig. 10. (*C. palustris* major, Mich. Gen. 69. tab. 33. fig. 13. Gram. Cyp. Rai Syn. 423. n. 8. Morif. §. 8. tab. 12. fig. 24. *G. palustre* cyperioides, Ger. Em. 21.) "Spike thrice compounded, compact, obtuse; fruit diverging; glumes acuminate; stems with compressed, very acute angles." *Root* perennial, fibrous, forming thick tufts. *Stem* two feet high, erect, stiff, strong, suddenly contracted in a singular manner, when it becomes the rachis of the spike, concavely and

acutely triangular; angles very rough. *Leaves* deep green, broad, higher than the stem, rough on the edges and keel. *Spike* oblong, sometimes a little interrupted; spikelets egg-shaped, upper flowers male; bracts egg-shaped at the base, brittle-shaped at the tip, rough, spreading widely; glumes egg-shaped, acuminate, membranous, brown, with a green keel. *Fruit* diverging, egg-shaped, acuminate, convex on one side, ribbed, cloven, and rough at the tip; stigmas two. *Seed* elliptical-orbicular. A native of marshes and the banks of rivers. 52. *C. glomerata*, Thunb. (*C. vulpina*, β . Wahlen. "Spike oblong; stem obtusely angular; leaves broadish, rather short. A native of the Cape of Good Hope. 53. *C. brizoides*, Linn. Sp. Pl. 9. Mart. 12. Lam. 18. Scop. Carn. n. 1170. Wahlen. 39. Schkuhr 32. tab. C. fig. 12. (*C. spicis teretibus acutis alternis se contingentibus*, Hall. Helv. 244. Mich. Gen. 70. tab. 33. fig. 17.) "Spike compound, two-ranked, naked; spikelets oblong, contiguous; stem naked." It appears from the herbarium of Linnæus that, early in life, he called the curta of Dr. Goodenough *brizoides*, there being a specimen of it so named by himself; but afterwards, as our excellent naturalist observes, he seems to have forgotten his own original determination upon the matter, for the specific character given in the Species Plantarum must have been intended for another plant. There is a specimen in the herbarium of Sir Joseph Banks, named *brizoides*, which answers entirely to this specific character, to the synonym of Haller, and to the figure of Micheli, and which Dr. Goodenough is persuaded is the *brizoides* of the Species Plantarum. It is the only specimen he has seen, and he has drawn the following description from it. *Root* perennial, creeping. *Stem* erect, naked, triangular; angles acute, rough. *Leaves* pale green, slender, longer than the stem, rough on the edges and the keel; the lower ones shorter and sheathing the base of the stem. *Spikelets* about seven, round, or a little oblong, rather in two ranks, near together, most frequently contiguous; lower flowers males; glumes oblong, acute, pale, with a green keel, somewhat tender, with a delicate white edge, about as long as the fruit. *Fruit* oblong, acute, smooth, somewhat triangular, minutely serrated at the edges, cloven at the tip, flat on one side; stigmas two. Dr. Goodenough adds, that the true *brizoides* is very properly described by Schreber in his Spicilegium Fl. Lips. p. 63. n. 675. See Linn. Transf. vol. ii. p. 148. According to La Marck it differs from *C. ovalis*, his *leporina*, in having its spikelets longer, acute, more slender, and not compressed. His description does not materially differ from Dr. Goodenough's, but he observes, that the spikelets are often curved, like those of *bromus pinnatus*. Wahlenberg gives the following specific character, which identifies his plant with those described by Goodenough and La Marck. "Spikelets numerous, male at the base, contiguous, somewhat lanceolate, sometimes curving outwards; fruit ovate-lanceolate, very convex on one side, a little concave on the other, attenuated, finely serrated at the edges; orifice bifid." A native of France, Switzerland, and Carniola. 54. *C. microsperma*, Wahlen. 30. "Spike thrice compound, thickish; spikelets, male at the top, clustered; glumes pointed; fruit small, ventricose-oval, with a short acuminate beak, acutely angular, somewhat diverging; stigmas two leaves rather narrow." A native of Pennsylvania, preserved in the herbarium of Thunberg. 55. *C. arenaria*, Linn. Sp. Pl. 6. Mart. 8. Lam. 14. Gooden. 10. Smith 11. Wahlen. 32. Eng. Bot. 928. Schkuhr 8. tab. B. fig. 6. (*C. maritima humilis*, Mich. Gen. 67. tab. 33. fig. 4. Rai Syn. p. 423. n. 5. Pluk. Phyt. tab. 34. fig. 8. Loef. Pruss. tab. 31.) "Spikelets clustered, spiked, almost monoicous; bracts membranous;

lower ones gramineous; stem triangular; leaves flat." *Root* perennial, creeping just below the surface in all directions, scaly, with downy fibres. *Stems* a foot high, numerous, erect, except when they are borne down by the sand, naked, sharply triangular, roughish in the upper part. *Leaves* sheathing the base of the stem, erect, acuminate, rough at the edges. *Spike* egg-shaped, compound, compressed; spikelets alternate, near together, brown, many-flowered; bracts lanceolate, keeled, membranous at the edge, the lower ones lengthened out into a leaf; male flowers in the upper part of each spikelet, very numerous in the upper spikelets; females most numerous in the lower; glumes egg-lanceolate, brown, scarcely membranous, pointed; fruit egg-shaped, acute, ribbed, bordered with a membrane on each side on the upper part, rough at the edge, cloven at the tip; stigmas two. *Seed* lenticular or obscurely triangular. Frequent among the sand of the sea-shore, flowering in June. 56. *C. repens*, Bellardi. App. Flor. Pedem. (*C. arenaria*, β . Wahlen.) "Spikelets rather near together; bracts small, scaly, awnless; stem roundish. A native of Piedmont. 57. *C. intermedia*, Gooden. 11. Smith 12. Wahlen. 31. Schkuhr 9. tab. B. fig. 7. (*C. disticha*, Mart. 55. Hudf. Relh. Sibthorp. *C. arenaria*, Leers, tab. 14. fig. 2. *C. spicata*, Pollich. n. 875. Lam. 15. Rai Syn. p. 423. n. 4. Pluk. Phyt. tab. 34. fig. 7, not good. Morif. § 8. tab. 12. f. 32. "Spikelets clustered, spiked, some of the lowest and the terminal one female; intermediate ones male; stem triangular, erect." *Root* perennial, creeping; but striking deep into the ground. *Stems* a foot high and more, erect, stiff, naked, acutely triangular, rough at the angles. *Leaves* sheathing the base of the stem, scarcely as high, erect, flat, roughish at the edge and on the keel. *Spike* oblong, obtuse, rusty brown, soft, a little compressed, not at all two-ranked; spikelets near together, numerous, imbricated towards the top, egg-shaped, often one or two male flowers at the top of the female spikelets, and one or two female ones at the base of the males; bracts egg-lanceolate, membranous, keeled, brown, with a white edge; lower ones ending in a brittle-shaped leaf; glumes egg-shaped, brown, with a pale nerve, membranous and white at the edge. *Fruit* egg-shaped, acute, bordered with a membrane on each side, rough at the edge, cloven at the tip; stigmas two, sometimes three. A native of marshy ground. 58. *C. uliginosa*, Linn. Sp. Pl. 7. Mart. 9. Lam. 13. "Spike compound; lower spikelets remote, furnished with a long gramineous bract; stem round." Similar in appearance to *C. arenaria*, but the root is not manifestly creeping. *Stem* a finger's length, round, glossy, naked. *Spike* more compressed than in any other species, rust-colour spikelets seven or eight; at the base of the spike there is a leaf of the same length with it, erect, glossy, linear. *Leaves* next the root alternate, convex beneath, channelled above, glossy on both sides, linear, acuminate, shining, as long as the stem, Linn. Turf-moors in Sweden. A species scarcely known, and not retained by Wahlenberg. 59. *C. paradoxa*, Wahlen. 24. Willd. Act. Berol. Schkuhr. 23. tab. E. fig. 21. "Spikes male, forming a panicle; lower branches a little distant; fruit roundish-oval, slightly convex; angles rather obtuse; orifice two-toothed; stigmas two." A native of wet ground about Berlin and Hall. 60. *C. teretiuscula*, Gooden. 16. Smith 15. Linn. Transf. v. ii. tab. 19. fig. 3. Eng. Bot. 1065. (*C. paniculata*, β . Wahlen. *C. diandra*, Schrank.) "Spike twice or thrice compound, dense, rather pointed; spikelets clustered; fruit spreading, gibbous; stem roundish." *Root* fibrous, somewhat creeping, not forming a tuft. *Stem* a foot or a foot and a half high, acutely triangular, but the sides between the

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the angles are convex, which gives it the roundish appearance expressed in the trivial name. *Leaves* erect, somewhat rigid, about the length of the stem, rough at the edges and on the keel. *Spike* oblong-egg-shaped; spikelets egg-shaped; upper flowers female; bractes egg-shaped, membranous, the lowest with a rough, often very short foliaceous point; glumes egg-shaped, brown, membranous at the edges, white, with a very even keel. *Fruit* brown, egg-shaped, acuminate, very convex on the outside, rather flat on the other, gibbous on both sides at the base, hispidly ferrated on both sides near the tip, greenish cloven at the tip; stigmas two. *Seed* orbicular, gibbous on the outside. A native of boggy ground. Mr. Crowe of Norwich is the first English recent discoverer of this plant, but it was known to Ray, as is evident from the addition to his description of the next species. Synop. p. 197. 1st. ed. 422. 3d. 61. *C. paniculata*, Linn. Sp. Pl. 17. Mart. 18. Lam. 24. Weylen. 25. Leers tab. 14. fig. 4. Eng. bot. 1064. Schkuhr 23. tab. C. fig. 20. (*C. spica multiplici ferruginea*; Mich. gen. 58. tab. 33. fig. 7. *C. spica longiore laxa*. Rai Syr. 422. n. 1. Morif. § 8. tab. 12. fig. 23. *Cyperus alpinus longus inodorus*; Scheuchz. Prod. 27. tab. 8. fig. 2.) "Spike thrice compound, panicle branched, acute, interrupted; fruit spreading, beaked; stem acutely triangular." *Root* perennial, fibrous, forming large and firm tufts in bogs which would otherwise be scarcely passable. *Stem* two or three feet high, erect; angles very rough; sides flat, with many ribs. *Leaves* acuminate, erect, rough on the edges and keel. *Spike* thrice compound; branches alternate, somewhat spreading, a little separate; spikelets egg-shaped; lower flowers female, few; bractes egg-shaped, acute, brown, rough on the keel, membranous and white at the edge, the lowest ending in a rough bristle-shaped point. *Fruit* green, lanceolate-egg-shaped, convex on one side, with a sharp, cloven beak, rough on both sides near the tip; stigmas two. *Seed* egg-shaped, convex on the outside. The spike varies in being more or less branched. A native of wet, spongy ground, flowering in June. 62. *C. rivularis*, Wahlen. 26. Willden. Schkuhr 21. tab. C. c. fig. 87. "Spikelets male at the top, five, rather near together, oblong; glumes as long as the fruit, mucronate; fruit roundish-ventricose, somewhat beaked, membranous at the edge near the tip; orifice divided, stigmas two." A native of Hungary on the banks of rivers. 63. *C. spartea*, Wahlen. 55. (*C. indica*, Schkuhr 27. tab. B b. fig. 86.) "Spikes compound; branches aggregate, male, and linear at the top; glumes oval; bractes sheathing, fruit triangular, nearly globular, rather obtuse; orifice emarginate; stigmas three; leaves narrow, a little incurved at the edges." A native of the Cape of Good Hope. 64. *C. indica*, Linn. Mant. 574. Mart. 19. Lam. 26. Wahlen. 56. "Spikes cylindrical, paniced, pinnate; a few of the lowest flowers female." Linn. *Stems* a foot and a half high, erect, obscurely triangular, smooth and even. *Leaves* on the stem remote, rough at the edges, often longer than the stem. *Panicle* formed of many alternate, stiff, triangular, spreading racemes; spikelets alternate, nearly sessile, in two rows, remote, spreading, imbricated on all sides with awl-shaped scales, with two or three female flowers at the base; bractes sheathing. *Fruit* egg-shaped, acute, triangular. Linn. Stigmas three, Wahlen. A native of the East Indies. 65. *C. polytachya*, Wahlen. 57. Swartz. Flor. Ind. Occid. App. "Spikes compound, pinnate; branches crowded, numerous, attenuated upwards, stigmas three; glumes lanceolate; bractes sheathing; fruit lanceolate, with an awl-shaped recurved beak; stem stiff." A native of the highest mountains in Jamaica. 66. *C. cladochachya*, Wahlen. 58. (*C. flaccida*; Swartz. Append.) "Spikes compound; branches

rather near together, few, weak, with scattered flowers; glumes lanceolate, bractes sheathing; fruit oblong; with an awl-shaped beak curved outwards, stigmas three; stem flaccid; leaves very narrow." A native of mountains in Jamaica. 67. *C. scabrella*, Wahlen. 59. (*C. laxa*; Swartz Flor. Ind. Occ. App.) "Spikes compound; branches clustered, somewhat globular-ovate; bractes sheathing; fruit oval, acute, a little curved outwards; stigmas three; stem feeble, leaves very narrow." A native of mountains in Jamaica. 68. *C. cruciata*, Wahlen. 60. "Spikes doubly compound; branches and branchlets divaricated; bractes sheathing; fruit oval, with a short beak rather curved outwards; stigmas three." A native of the neighbourhood of Canton in China. 69. *C. ovata*, Rudge in Linn. Trans. vol. 7. p. 96. tab. 9. fig. 1. "Spikes egg-shaped, pendulous; fruit egg-shaped, acute." *Stem* erect, triangular; angles acute, rough. *Leaves* erect, slender, rough at the edges. *Spikes* four or five, peduncled; flowers densely imbricated; glumes egg-shaped, acute, brown, as long as the fruit; bractes at the base of the peduncles a little embracing the stem. *Fruit* egg-shaped, compressed, acuminate, cloven at the tip; stigmas three, glandular, rather thick. A native of Newfoundland. 70. *C. magellanica*, Lam. 25. Schkuhr tab. N. fig. 51. (*C. atrata* β. Wahlen.) "Spikes oblong, on long peduncles; fruit compressed, lenticular." In habit and size resembling *Juncus campestris*. *Stem* five or six inches high, leafy. *Leaves* as long as the stem, two lines broad, smooth, flat, straight. *Spikes* three or four, half an inch long, brown or blackish, a little compressed; peduncles almost capillary, the length of the spikes; glumes brown, acuminate; bractes sheathing. *Fruit* smooth, compressed, lenticular, yellowish, shorter than the glumes; stigmas three; gathered by Commerlon in the straits of Magellan. 71. *C. brunnea*, Mart. 20. Lam. 27. Wahlen. 54. Thunb. Flor. Japon. p. 38. Schkuhr tab. X x. fig. 3. "Spikes peduncled, linear; male flowers at the top." *Stem* a foot high, triangular, smooth. *Leaves* linear, acute, striated, keeled, entire, smooth, straight, longer than the stem. *Spikes* about twelve, half an inch long, pointed, straight, smooth, on capillary peduncles; glumes egg-shaped, acute; stigmas two. A native of Japan. 72. *C. subulata*, Wahlen. 69. "Spikes narrow, rather long, somewhat densely flowered, male at the top; peduncles sheathed; two-cleft; bractes foliaceous, very long, remote; glumes ending in an awn much longer than the fruit; fruit oval, triangular, depressed, beaked, bicuspidate; stigmas three; leaves broad." A native of the Isle of Bourbon. 73. *C. Forsteri*, Wahlen. 81. (*C. debilis*; Forst. *C. recurva*; Schkuhr 100. tab. N. fig. 84.) "Spikes on long naked peduncles, cylindrical, pendulous, male at the base; bractes with rather long sheaths, foliaceous, very long, remote; fruit oblong-ovate, attenuated, with an awl-shaped recurved beak; male spikes two; stigmas three. A native of New Zealand. 74. *C. atrata*, Linn. 26. Mart. 77. 31. Lam. 12. Wahlen. 114. Gooden. 36. Smith 28. Flor. Dan. 158. Schkuhr 41. tab. X. fig. 77. (*Cyperoides alpinum spicis atris*; Scheuchz. Agr. 481. tab. 11. fig. 1, 2.) "Diandrous; spikes egg-shaped, peduncled, at first upright, pendulous in fruit, peduncles scarcely sheathed; male flowers at the bottom of the terminal spike; fruit compressed." *Root* perennial, fibrous. *Stem* a foot high and more, erect, triangular, striated, leafy at the base; angles scarcely rough. *Leaves* shorter than the stem, bright green, broad, flat, rough at the edges. *Spikes* often four, egg-shaped, dense, many flowered; terminal one with male flowers below, female above; the others with female flowers and a mixture of diandrous hermaphrodites; bractes foliaceous, embracing the stem but scarcely sheathing, spreading; the lowest often longer

longer than the stem; peduncles triangular, smooth and even; glumes egg-shaped, black. *Fruit* imbricated, a little shorter than the glumes, broad-elliptical, compressed, yellow, without ribs, smooth, scarcely beaked, emarginate at the tip. *Seeds* triangular, short, brown, stigmas three. A native of mountains in Wales, Scotland, and other parts of Europe. 75. *C. nigra*, Mart. 6. Allion. pedem. n. 2310. "Spikes erect, sessile, ternate, terminal, black; stem triangular, leafy." Similar to the preceding, but differs from it in its erect, sessile spikes. *Stem* from a finger's length to a foot high, striated, longer than the leaves. *Spikes* three or four, egg-shaped, thick, clustered, the lowest on a short peduncle, with a longer bract; the middle one sometimes plainly male at the top; glumes egg-shaped, acute, black with a whitish edge. Allion. 76. *C. bicolor*, Mart. 62. Allion. pedem. n. 2311. See Hall. helv. n. 1369. Scarcely more than a finger's breadth in height. *Leaves* scarcely half the length of the stem, grooved in the upper part with a prominent nerve, in the lower part smooth. *Spikes* egg-shaped, the first on a very short peduncle with a short bract, the others sessile without a bract; glumes egg-shaped, obtuse, black with a whitish nerve. *Fruit* a little swelling, egg-shaped, obtuse, greenish. Hall. helv. 1369. is quoted by La Marck as a synonym of *atrata*; and professor Martyn supposes that both the last two are only varieties of that species. 77. *C. Buxbaumii*, Wahlen. 129. (*C. polygama*; Schkuhr 70. tab. X. G. g. fig. 76. Buxbaum; Cent. 4. p. 33. tab. 39.) "Spikes pseudandrogynous, nearly sessile, oblong; bractes partly embracing the stem, foliaceous, distant; glumes nearly as long as the fruit, cuspidate; fruit oval-oblong, rather obtuse, triangular, depressed; orifice two-toothed; stigmas three. A native of Sweden and Lapland. 78. *C. bina*, Wahlen. 130. Schkuhr 26. tab. G. fig. 33. "Spikes pseudandrogynous, two, nearly sessile, oval; bractes partly embracing the stem, scaly, near together; glumes elliptical, obtuse; fruit inversely egg-shaped, triangular, pointed; orifice two-toothed; stigmas three." A native of Bohemia? *** *Male and female flowers on distinct spikes; male spikes, in most species, one; in some, two or more.*

79. *C. digitata*, Linn. 20. Mart. 33. Lam. 38. Gooden. 18. Smith 19. Wahlen. 105. Schkuhr 63. tab. H. fig. 38. Eng. bot. 615. Leers tab. 16. fig. 4. (*Gramen caryophyllatum*; Loef. Pruff. 112. tab. 27. Bauh. Prod. 9. n. 23. Scheuchz. 448. tab. 10. fig. 14. Mich. gen. 65. tab. 32. fig. 9.) "Bractes membranous, rarely foliaceous, sheathing; spikes linear loose, erect; male spike shorter; leaves flat." *Root* perennial, fibrous, black, long and much branched. *Stems* six or eight inches high, ascending, spreading, roundish or obscurely triangular, smooth and even; sheathed at their base by cylindrical, dark red, leafless scales. *Leaves* bright green, keeled; their edges rough near the base with teeth pointing backwards, smooth and even about the middle, and rough with teeth pointing forwards towards the tip; keel perfectly smooth; sheaths red. *Spikes* about eight-flowered; male spike placed below the upper female one, so as to appear shorter, but often absolutely longer; female spikes two or three; all growing in a finger-like manner; bractes half the length of the peduncles, sheathing, oblique at the orifice, membranous, ending in a short dagger-point, which sometimes, but rarely, becomes foliaceous; glumes inversely egg-shaped, refuse, brownish red, membranous and silvery at their edge, especially the male flowers; keel green. *Fruit* triangularly club-shaped, green, pubescent, entire at the orifice; stigmas three. *Seed* acutely triangular. A native of moist woods, flowering in May. It appears to have been found no where in England but in Somersetshire and

Yorkshire. 80. *C. pedata*, Linn. 19. Mart. 22. Lam. 39. (Hall. helv. 1375. *Gram. caryophyllum nemorosum*, spica multipliei, Bauh. pin. 4. Scheuchz. 450. *Angustissimis foliis*, Moris. hist. 3. p. 243. n. 12. *Cyperoides* Mich. gen. 65. tab. 32. f. 14.) "Male spikes sessile, oblong; lower one axillary; leaves almost thread-shaped." Nearly allied to the preceding, but smaller, with narrower leaves and spikes nearer together, imitating a bird's foot. La Marck. *Root* perennial. *Stem* naked, slender, about the length of the leaves. *Leaves* four or five inches long, (a foot, Linn.) near a line broad, fasciculated, acute, striated. *Spikes* one male, two female, nearly on a level; one female lower, proceeding, according to La Marck, from an oblong, membranous, reddish sheath; according to Linnæus, from the axil of a leaf as long as the stem. *Fruit* slightly pubescent. A native of mountainous woods in Lapland, Switzerland, Dauphny, and Piedmont. Wahlenberg considers the *pedata* of Schkuhr 62. tab. H. fig. 37. as only a variety of *digitata*; and asserts that the *pedata* of Linnæus is not now known to the Swedish botanists. 81. *C. clandestina*, Gooden. 19. Smith 20. Wahlen. 103. Schkuhr 67. tab. K. fig. 43. (prostrata, Mart. 69. Allion. pedem. v. 2. 267. humilis, Leyfer. Hal. 175. Villars Dauph. 2. 205. Schreb. Spic. flor. lipf. n. 1013. Scariofa, Lam. 37. *Cyperoides montanum*, Scheuchz. 407. tab. 10. fig. 1.) "Bractes membranous, seldom foliaceous, sheathing; female spikes remote, few-flowered, enclosed in the sheaths; leaves channelled." *Root* perennial, fibrous. *Stems* in tufts, an inch or two long, rather erect, obscurely triangular, smooth. *Leaves* three times as long as the stems, erect, deep green, very rough at the edges. *Male spike* terminal, solitary, erect, lanceolate, many-flowered; bractes sheathing, membranous, obtuse; glumes imbricated, lanceolate, brown, membranous and white at the edge; females two or three, lower, remote, alternate, peduncled, small, few-flowered, (two, sometimes one-flowered, Lam.) each concealed with its bract. *Fruit* inversely egg-shaped, triangular; orifice entire; stigmas three. *Seed* triangular. The leaves which overshadow the stems at their first appearance are those of the preceding year, which usually continue green till their predecessors take their place. A native of mountains in Switzerland and Dauphny. In England it has hitherto been found only on exposed sunny spots about St. Vincent's rocks near Bristol. The singular circumstance of the bractal sheaths enclosing the female spikes as well as their peduncles, induced Dr. Goodenough to call the species *clandestina*, a trivial name which is to be preferred as being discriminatively expressive, though it has not the claim of priority. 82. *C. alba*, Mart. 72. Wahlen. 104. Schkuhr 81. tab. O. fig. 55. Scop. carn. 1148. Allion. pedem. 2322. (Hall. helv. 1377. Scheuchz. tab. 10. fig. 4. 5. Mich. gen. 61. n. 79, 80. *C. argentea*, Villars Dauph. 2. 206.) "Spikes peduncled, white, sheaths long, obtuse; filaments and styles long, white." *Stem* round, slender, with three white leafy sheaths. The two upper spikes from one sheath, the lower single. *Glumes* of the male spike almost transparent; of the female spikes keeled, acuminate; anthers terminating in a lucid point; female flowers few. *Fruit* turgid, roundish, smooth, striated, growing black in autumn. *Seed* triangular, shining, acuminate. Linnæus was either unacquainted with this species, or confounded it with *digitata*. Scop. 83. *C. Pennsylvanica*, Lam. 36. "Spikes variegated with brown and white; male terminal, oblong; female sessile, egg-shaped, either with or without a bract." *Stem* nine or ten inches high, upright, very slender, triangular, leafy only at their base. *Leaves* scarcely half the length of the stem, less than a line broad, flat, striated. *Male spike* terminal, upright, a little acute; glumes oblong,

oblong, obtuse, smooth, reddish brown, membranous and white at their edges. *Female spike* a little below the male, sessile, egg-shaped, short, few-flowered, sometimes without, and sometimes with a bract, scarcely the length of the spike; glumes similar to those of the male. At the base of the male spike there is sometimes the rudiment of another female spike not distinctly separated from it. A native of Pennsylvania and New York. 84. *C. supina*, Wahlen. 106. Willden. (*C. glomerata*, Schkuhr 65. tab. I. fig. 41.) "Female spikes about two, nearly sessile, globular; bractes somewhat embracing the stem, scaly, crowded; fruit nearly globular, beaked; orifice two-lobed; stigmas three; male spike slender; leaves very narrow." 85. *C. varia*, Wahlen. 107. "Female spikes few-flowered, nearly sessile; male slender; bractes somewhat embracing the stem, scaly, rather near together; glumes acuminate, mucronate, rather long; fruit oval-ventricose, rather acutely triangular, a little hispid; beak awl-shaped, shortish, bifid; stigmas three; leaves very narrow." A native of North America. 86. *C. pilulifera*, Linn. Sp. Pl. 24. Mart. 28. Lam. 29. Gooden. 37. Smith 37. Eng. bot. 385. (*C. montana*, Linn. Sp. Pl. 21. Hudf. 407? *C. filiformis*, Fl. Dan. tab. 1048. *C. conglobata*, Mart. 70. Allion. pedem. n. 2314. Hall. helv. n. 1372. Scheuch. tab. 10. fig. 8, 9? Gramen cyperoides, Rai Syn. p. 421. n. 19 and 20. Pluk. Phyt. tab. 91. fig. 8.) "Bractal sheaths none; female spikes sessile, crowded, roundish; glumes mucronate; fruit roundish, villous." *Root* perennial, fibrous. *Stem* often recumbent, incurved, about nine inches high, feeble, naked, rough near the top. *Leaves* deep green, rough at the edges and on the keel. *Bractes* brittle-shaped, short, triangular, scarcely at all sheathing. *Male spike* lanceolate, acute; glumes of a rusty brown colour, lanceolate, acute, with a green keel, and a membranous white edge. *Female spikes* two or three, sessile, close together, roundish, spreading; glumes egg-shaped, acute, coloured like those of the male. *Fruit* shorter than the glumes, roundish, obscurely triangular, green, villous on all sides. *Seed* nearly globular, yellowish. It varies with blunt glumes, less conspicuously keeled. Dr. Smith. This is certainly the *C. montana* of the Linnæan herbarium, and Dr. Smith concludes from the reference to Plukenet, that he described it from that author as his original *pilulifera*, without having a specimen before him. Dr. Goodenough thinks it certain that the spike of one and the same plant under two names; in its more fruitful state with three female spikes, calling it *pilulifera*, and in its more starved appearance when produced on elevated dried plains, where it has only two, and sometimes only one, *montana*. La Marck has a *montana* which he thinks may possibly be the *montana* of Linnæus, excluding the synonyms. It seems to differ from *pilulifera* in having shorter leaves, blackish spikes, and fruit more evidently downy, and quotes as probable synonyms, *cyperoides angustifolium montanum*, *folliculis feminum villosis*, Scheuch. gram. 423. and Hall. helv. n. 1373. It was sent him from Switzerland by M. Vahl. Wahlenberg, who with respect to Swedish plants must be good authority, determines the *pilulifera* and *montana* of Linnæus to be different plants, and gives the following specific characters. *C. pilulifera*, n. 112. Willdenow. Schkuhr 46. tab. I. fig. 39. "Spikes nearly sessile, globular; male slender; bractes partly embracing the stem, somewhat foliaceous, attenuated, near together; glumes mucronate, rather long; fruit somewhat globular, acute, pubescent; stigmas three; stem feeble, finely ferrated. 87. *C. montana*, Linn. Wahlen. 109. Schkuhr 58. tab. F. fig. 29. "Spikes rather few-flowered, nearly sessile; bractes crowded, somewhat scaly, embracing the stem; keel cuspidate; bractes

pitch-coloured, mucronate, as long as the fruit; fruit oval-wedge-shaped, rather acutely triangular, a little rough; stigmas three; leaves very narrow." 88. *C. mucronata*, Mart. 71. Wahl. 40. Allion. pedem. n. 2318. Hall. helv. 1374. Mich. gen. tab. 32. fig. 3. Schkuhr 46. tab. K. fig. 44. "Spikes sessile, near together, very short; glumes lanceolate, mucronate." *Stem* a foot high, naked at the top; *Leaves* rush-like. *Spikes* generally three; male, longer, round; females two, five-flowered; glumes bay, ovate-lanceolate, pale about the edge; nerves yellow, shining; bractal leaf of the lower spike with a long slender point, much longer than the spike. Haller. *Stigmas* two. Wahlen. 89. *C. tomentosa*, Linn. Mant. 123. Mart. 25. Lam. 32. Smith 38. Leers. 200. tab. 15. fig. 7. Wahlen. 108. Schkuhr 51. tab. F. fig. 29. "Bractal sheaths very short; female spikes nearly sessile, cylindrical, obtuse; glumes elliptical, acute; fruit downy." *Root* perennial, creeping. *Stem* a foot high, erect, naked, acutely triangular, angles near the top rough. *Leaves* shorter than the stem, erect, flat, bright green, rough on both sides, and at the edges. *Bractes* foliaceous, a little spreading, scarcely longer than the stem. *Male spikes* lanceolate, rather obtuse; glumes lanceolate, of a rusty brown colour, with a green keel, the upper ones slightly mucronate. *Female spikes* generally two, not very near together, cylindrical, obtuse, various in length, on short peduncles; glumes elliptic-egg-shaped, scarcely mucronate, of a rusty brown colour, with a bright green keel. *Fruit* about the length of the keel, densely imbricated, roundish, a little compressed, scarcely triangular, green, clothed on all sides with dense, short down, which at first is white, and finally of a gold colour. *Seed* white, obscurely triangular. Dr. Smith. *Stigmas* three. Wahlen. Found by Mr. Teesdale in meadows near Merston Mersey, Wiltshire. La Marck's plant, which does not materially differ, was gathered in the neighbourhood of Paris. 90. *C. saxatilis*, Linn. Sp. Pl. 25. Wahlen. 140. (*Cyperoides alpinum saxatile*, Mich. gen. 63. tab. 32. fig. 4?) "Spikes three, egg-shaped, sessile, alternate; male oblong." *Terminal spike* male, of a pale rusty colour. *Female spikes* two, black, the lower one with a bristle-shaped leaf, shorter than the spike; glumes the length of the pistils; germs black, triangular; styles black, bifid, long. A native of the mountains of Lapland and Switzerland. La Marck supposes that it scarcely differs from the preceding. Wahlenberg gives it the following character, which proves it distinct. "Spikes nearly sessile, rather densely flowered, very obtuse; male oval; glumes circinate, white at the edge; bractes partly embracing the stem, with largish auricles, foliaceous, very narrow, distant; glumes nearly as long as the fruit; fruit oblong, oval upwards, flat on both sides, rather acute, a little curved outwards; orifice equal; stigmas two." 91. *C. præcox*, Mart. 84. Lam. 31. Jacq. Aust. tab. 446. Gooden. 22. Smith 36. Wahlen. 98. Schkuhr. 59. tab. F. fig. 27. (*C. saxatilis*, Hudf. *C. montana*, Relb. 353. Lightf. 551. Gram. cyper. vernum minimum, Rai Syn. 421. Ger. em. 22. Morif. § 8. tab. 12. fig. 11.) "Bractal sheaths nearly as long as the peduncle; spikes egg-shaped, near together; glumes a little mucronate; fruit roundish, pubescent." *Root* creeping, and branching out into several leafy tufts. *Stem* ascending, from three to six inches high, naked, obscurely triangular, smooth. *Leaves* short, rigid, recurved, a little revolute, roughish, especially at the edges. *Bractes* erect, often wanting; sheaths short, dilated upwards. *Male spike* inversely egg-shaped, rather obtuse; glumes elliptical, of a rusty colour, bluntish; anthers sulphur-coloured. *Female spikes* generally two, near together, on short peduncles, egg-shaped, nearly erect; glumes

glumes broad, egg-shaped, rather pointed, of a rusty colour, with a green keel. *Fruit* scarcely the length of the glume, roundish or somewhat pear-shaped, pubescent, green, brown at the tip. *Stigmas* three. *Seed* white. A native of dry exposed pastures and heaths, flowering in April. 92. *C. triflachya*, Mart. 30. Wahlen. 101. Schkuhr tab. W w, fig. 169. Thunb. Jaq. 38. "Spikes three, sessile, linear, male longer." *Stem* four inches high, triangular, capillary, striated, smooth, erect. *Leaves* only one or two, alternate, linear, smooth, reflected, short. *Bractes* shorter than the spikes. A native of Japan. 93. *C. trigona*, Mart. 74. Allion. pedem. n. 2325. tab. 89. fig. 4. "Male spike peduncled; females sessile, remote, triangular." *Stem* a foot high or more, triangular, striated, smooth, leafy. *Leaves* dark green, striated, linear, shorter than the stem. *Male spike* oblong; glumes bay, obtuse. *Female spikes* three, axillary; upper one frequently androgynous; leaf of the lowest very long. A native of Piedmont. 94. *C. foliosa*, Mart. 75. Allion. ped. n. 2328. Hall. helv. 1384. "Female spikes sessile; lowest peduncled; glumes very narrow." *Stem* a foot high, triangular. *Leaves* as long as the stem, about two lines broad, smooth, with rough edges. *Male spike* long, cylindric, slender, pale bay and white. *Female spikes* two, (sometimes four) crowded, each with a long leaf. *Fruit* slender, with long beaks. Hal. A native of Piedmont and Switzerland. 95. *C. obesa*, Mart. 77. Allion. ped. 2330. Hall. helv. 1387. "Female spikes sessile, ternate; fruit egg-shaped, triangular." *Stems* four inches high, naked. *Leaves* short, not above a line in breadth, rough. *Male spike* half an inch long, dark bay, obtuse, broadish. *Female spikes* two or three, distant, shorter than the male, of the same colour, few-flowered. There is sometimes an androgynous spike under the male. A native of Piedmont and Switzerland. 96. *C. globularis*, Linn. Sp. Pl. 22. Wahlen. 111. "Male spike oblong; female sessile, egg-shaped, with a bracte shorter than the spike." Linn. "Spikes nearly sessile, egg-shaped; male slender; bractes partly embracing the stem, somewhat foliaceous, distant; glumes shortish; fruit oval-ovate, acute, rough; stigmas three; stem flaccid; leaves very narrow." Wahlen. A native of Sweden and Lapland; common. 97. *C. alpina*, Wahlen. 113. Swartz. Liljeblad Succ. flor. (C. Vahlh. Schkuhr 72. tab. Gg, fig. 94. C. montana, Flor. Dan. 403.) "Spikes three, on short peduncles, somewhat globular, pseudandrogynous; bractes partly embracing the stem, somewhat foliaceous, near together; glumes very black; fruit rather pubescent, pointed." A native of Lapland. Very variable and difficult to be characterized, but perfectly distinct. 98. *C. ericetorum*, Lam. 33. Pollich. pal. n. 886. Schkuhr Wahlen. 110. (C. approximata, Allion. ped. 2313. C. ciliata, Willden. Schkuhr 66. tab. 3. fig. 42. Hall. helv. n. 1371. Scheuch. gram. 421. tab. 10. fig. 10.) "Male spike inversely egg-shaped, obtuse; female spikes sessile, egg-shaped; fruit pubescent." *Stem* four inches high, triangular, almost naked. *Leaves* in tufts, rather rigid, keeled, about the length of the stem. *Male spike* terminal, short, variegated with brown and white; glumes obtuse, blackish brown, white and silvery at the edge. *Female* generally solitary, sometimes two, alternate, near together; bracte of the lower one terminated by a short, nearly awl-shaped leaf. A native of Switzerland and Germany, on dry hills. La Marck doubts whether it may not be the globularis of Linnaeus; but Wahlenberg's description of that species given above, proves the conjecture to be erroneous. 99. *C. Borbonica*, Lam. 34. "Female spikes erect, sessile; upper ones crowded; male thicker, terminal; leaves sword-shaped. *Stem* a foot high, leafy,

enveloped at its base with the sheaths of numerous root leaves. *Leaves* resembling those of *ixia crocata*, nearly as long as the stem, about three lines broad, striated. *Female spikes* three or four, acute; lower one distant from the others, in the axil of a narrow leaf; glumes acute, reddish, with a green keel. Found by Commerfon in the Isle of Bourbon. 100. *C. Virginiana*, (C. stricta, Lam. 35.) "Female spikes two, sessile, erect, with male flowers at the top; male terminal, remote; stem naked." *Stem* about a foot high, slender, compressed above, triangular below, rough. *Leaves* as long as the stem, near two lines broad, striated. *Male spike* terminal, an inch long; glumes obtuse, brown with a white edge. *Female spikes* distant from the male, sessile, upright, linear, pressed close, reddish brown, with some male flowers at the top; lower one with a bracteal leaf as long as the spike. A native of Virginia, Pennsylvania, &c. described by La Marck from a dried specimen. 101. *C. nana*, Lam. 40. Scheuch. Gram. 437. tab. 10. fig. 12. "Spikes erect, variegated; male egg-shaped; lower female peduncled, axillary." *Stem* an inch and half, or two inches high, with three or four short, upright, acute, sheathing leaves. *Root leaves* striated, slightly keeled, smooth, about the length of the stem. *Spikes* three or four; male terminal, upright; glumes oval, mucronate, brown, with a green keel, and a membranous, whitish edge; females upright, oblong, coloured like the male. A native of mountains in Switzerland. 102. *C. alpestris*, Mart. 76. Allion. ped. n. 2329. Hall. helv. n. 1385. (C. gynobasis, Villars dauph. 2. 206. Wahlen. 99. Schkuhr 59. tab. G. fig. 35. "Lowest female spike radical; fruit triangular, elongated." *Stems* from three to nine inches high, naked. *Leaves* in tufts, two lines broad, keeled, acuminate, smooth except at the tip. *Spikes* very small; male four lines long; glumes egg shaped, obtuse, with a yellow keel and white edge; upper female spike sessile, an inch below the male, few-flowered; bracte sheathing long, awned; lower one with about six flowers, on a peduncle, three inches long or more. There are sometimes, but rarely, three female spikes. A native of Piedmont and Switzerland. The alpestris of La Marck agrees in some respects with the preceding, but as he says nothing of the great distance of the lower female spike from the others, from which circumstance Villars took his trivial name, it must be a different plant. He received it from the neighbourhood of St. Maurice in the Valais, and as he gives no synonyms, certainly supposed it a non-descript. We shall call it for the present 103. *C. Lamarckii*, "Female spikes about three, erect; upper ones sessile; fruit smooth, globular, mucronate." *Stem* seven or eight inches high, naked, slender, cylindrical, compressed, striated. *Leaves* in tufts three or four inches long, glaucous, striated, smooth. *Spikes* three, or four of a russet colour; male terminal, half an inch long; scales rather obtuse, membranes at the edges; the upper female spikes short, nearly sessile, each with a pointed bracte about its own length; lowest larger, peduncled, in the axil of a very narrow bracteal leaf longer than the spike; glumes egg-shaped, rather blunt, smooth, russet, membranous and white at the edge. *Fruit* smooth, almost globular, mucronate. 104. *C. tenuifolia*, Lam. 52. Poir. Voyage en Barbarie. Vol. 2. p. 254. "Female spikes erect, few-flowered; lower ones distant on long peduncles; upper ones nearly sessile; leaves very narrow." *Root* perennial, creeping, blackish, surrounded at the top with numerous brown filaments. *Stems* several, six or seven inches high, very slender, triangular, compressed, moderately leafy. *Leaves* very narrow, filiform smooth, green, keeled, a little folded in at the edges, longer than the stems. *Male spike* terminal, about half an inch long, upright, oblong, acute, of a russet colour.

Female spikes upright, less than the male, few-flowered, of a russet-green colour, distant from each other, upper one near the male with a scaly bracte; the two others peduncled and axillary; the lowest in a very long, capillary peduncle, which springs almost from the bottom of the stem; glumes egg-shaped, scarcely acute, greenish and striated on the back, red or rust-coloured at the edge near the tip. A native of Barbary on moist, elevated ground. This plant is nearly allied to the *alpensis* of Allioni, but differs in the breadth of the leaves, and colour of the glumes. 105. *C. hordeiformis*, Wahlen. 72. (*C. hordeistichos*; Villars, 2. n. 43. tab. 6.) "Spikes very thick; peduncles sheathed; bractes foliaceous, very long; the lowest nearly radical, the others rather near together; fruit egg-shaped, acuminate, somewhat beaked, very convex on one side, a little concave on the other, serrate-ciliated at the edges; orifice bifid; stigmas three; male spikes two." A native of Dauphiny. 106. *C. firma*, Wahlen. 100. Host. Schkuhr 69. tab. O. Y. fig. 54. "Spikes stiff, oblong, rather many-flowered; peduncles naked; bractes somewhat foliaceous, rather remote; sheaths short; fruit oblong, lanceolate, with a slender beak, acutely and finely serrated at the edges; stigmas three, orifice one-lobed." A native of the Austrian alps. 107. *C. verna*, Wahlen. 102. Schkuhr 74. tab. L. fig. 46. "Spikes oval; peduncles naked; bractes foliaceous, distant; sheaths very short; glumes broad-ovate, obtuse; fruit oval, pointed; orifice obtusely one-lobed; stigmas three; stem acutely angular." A native of Switzerland. 108. *C. ferruginea*, Mart. 78. Wahlen. 84. Allion. ped. n. 2333. Scop. Carn. 1159. Hall. helv. 1390. Scheuch. 10. 6. (*C. alpina*, Schrank.) "Male spike acuminate; female two or three, slender, peduncled; glumes rust-coloured; fruit bifid." Stem half a foot high, pale green. *Male spike* an inch long, glumes long, narrow, acuminate, rust-coloured, with a green keel. *Female spikes* three or four; the first with a short bracte, the second with a leaflet as long as itself, the third with a longer leaflet; glumes green with a rust-coloured edge; stigmas three. A native of Switzerland, Piedmont, and, if Scopoli be right in thinking his plant the same as Haller's, of Carniola, though it is not alpine there as it is in the Grisons. 109. *C. sempervirens*, Villars dauph. 2. 214. *Stems* eight or ten inches high, slender, hard. *Leaves* in tufts, long, hard but flexible, continuing through the winter till the new ones come up when they are completely bleached. *Spikes* three; male blackish, variegated with grey; females loose, peduncled; glumes blackish-brown with a green keel. *Fruit* triangular, blackish, smooth, except near the top. *Seed* triangular, grey, elongated. A native of Dauphiny. Professor Martyn gives it as a conjectural synonym of the preceding, because Villars has referred to Scopoli and Haller with a mark of doubt. 110. *C. frigida*, Mart. 79. Wahlen. 83. Allion. ped. 2344. Hall. helv. n. 1391. Villars dauph. 2. 215. (*C. variegata*; Lam? *C. fuliginosa*; Schkuhr. 76. tab. C. c. fig. 47.) "Female spikes three or four, two-rowed; fruit long, pointed." Mart. "Spikes three, nearly erect, brown and white; glumes membranous at the tip; fruit acuminate, roughish." Lam. Stem half a foot high and more, naked. *Leaves* a line broad or more, smooth, except at the edge. *Male spike* near an inch long, often fertile at the bottom; glumes sharply lanceolate, shining bay, with a green or yellowish keel. *Female spikes* axillary, lower ones pendant. Hall. Villars says it differs little from his *sempervirens*. La Marck refers to Haller and Allioni with a mark of doubt. He gives the following description from a dried specimen gathered on the mountains of Dauphiny. *Root* perennial, strong, with greyish or brown fibres. *Stem* from seven to ten inches high, slender, naked. *Leaves* un-

equal in length, the largest five inches long, and little more than a line broad, striated, smooth, hard, firm. *Male spike* terminal, upright, five or six lines long; glumes obtuse, very membranous and white at the tip, brown on the back with a whitish line. *Female spikes* two, peduncled, especially the lowest, short, brown, variegated, pendant when in fruit. *Fruit* egg-shaped, acuminate, compressed before they arrive at maturity, a little rough. 111. *C. rigida*, Mart. 82. Gooden. 38. Linn. Transf. vol. iii. tab. 22, fig. 10. Smith 39. Wahlen. 141. Schkuhr 47. tab. U, fig. 71. (*C. n. 1378*. Hall. helv. *C. fusca*; 73. Mart. *C. saxatilis*; Flor. Dan. tab. 159. *Cyperoides germanicum*; Mich. gen. 61. tab. 32. fig. 4.) "Digynous; bracteal sheaths none; spikes egg-shaped; upper ones sessile; leaves somewhat recurved, rigid; fruit rather compressed." *Root* perennial, thick, creeping. *Stem* from three to six or seven inches high, often curved, naked, rigid, acutely triangular; angles rough. *Leaves* rigid, recurved, rather glaucous, rough at the edges and on the keel. *Bractes* foliaceous, shorter than the stem, often recurved, auricled at the base. *Male spike* short, egg-shaped, rather obtuse, thick, rarely two; glumes obtuse, with a delicate greenish keel. *Female* often three, egg-shaped; two upper ones sessile, near the male, lower rather remote, erect, on a short peduncle; glumes elliptical, obtuse, black, with a white edge and a fine green keel. *Fruit* longer than the glumes, densely imbricated, elliptical, rather compressed, flattish on one side, smooth, brown outwards, sometimes lengthened at the tip, and recurved; orifice always undivided; stigmas two, thickish. On the top of Snowden in Wales; Ben Lomond and other mountains in the highlands of Scotland, flowering in June and July. 112. *C. brachystachya*. Wahlen. 82. Schrank. Schkuhr 83. tab. P. fig. 58. "Spikes on long naked peduncles, very narrow, short, loosely flowered; bractes sheathing, somewhat foliaceous, rather remote; glumes short, somewhat mucronate; fruit lanceolate; orifice two-toothed; stigmas three; stem bristle-shaped; leaves very narrow, convolute." A native of Switzerland. 113. *C. pulla*, Gooden. Linn. Transf. vol. iii. tab. 17. Smith 29. Wahlen. 142. (*C. fusca*; Schkuhr. 52. tab. C. c. fig. 88. *C. globularis* var. Vahl.) "Digynous; bracteal sheaths none; spikes egg-shaped; lower one peduncled; fruit elliptical-inflated, somewhat beaked, emarginate." *Root* perennial, creeping. *Stem* nearly erect, six or seven inches high, striated, triangular; angles rough towards the top. *Leaves* nearly erect, flat, rough at the edge. *Bracte* foliaceous, embracing the stem scarcely sheathing, rough at the edge. *Male spike* terminal, erect, lanceolate, many-flowered; females often two, remote, egg-shaped, erect; the lower on a long peduncle, the upper on a short peduncle, with a very short sheath, often none; peduncle rough; glumes all elliptic-lanceolate, obtuse, blackish brown, with a fine white edge and a faint nerve. *Fruit* spreading, longer than the glume, elliptical, smooth, not ribbed, pale at the base, blackish brown at the tip, shining. *Seed* triangular; stigmas two. A native of mountains in the highlands of Scotland, flowering in July. 114. *C. pallefcens*, Linn. Sp. Pl. 29. Mart. 34. Lam. 46. Wahlen. 121. Schkuhr 92. tab. K. k, fig. 99. Flor. Dan. 1050. Leers. 203. tab. 15. fig. 4. (Gram. cyper. Rai syn. 419. n. 8. Pluk. Phyt. tab. 34. fig. 5. Mich. gen. 61. tab. 32. fig. 13.) "Bracteal sheaths very short; spikes cylindrical, peduncled; fruit-bearing ones pendulous; fruit elliptical, inflated, obtuse." *Root* perennial, fibrous. *Stem* a foot high or more, erect, leafy at the base, triangular; angles rather acute near the top, rough. *Leaves* flat, pale, somewhat hairy, roughish at the edges. *Bractes* foliaceous, erect, considerably longer than the stem, with very short sheaths. *Male spike* terminal, lanceolate, erect, dense,

dense, pale rust-colour; females three, peduncled, first erect, afterwards pendulous; peduncles triangular, smooth, and even; glumes egg-shaped, acuminate, yellowish, with a green keel. *Fruit* the length of the glumes, elliptical, inflated, very obtuse, awnless, without ribs, smooth, pale green. *Stigmas* three. *Seed* triangularly-inversely egg-shaped. A native of moist pastures and woods in England, and other parts of Europe, flowering in May and June. 115. *C. clavata*, Wahlen. 64. Thunb. in Herbar. "Spikes nearly cylindrical, thick; male club-shaped; bractes sheathing the peduncle, foliaceous, remote; glumes nearly as long as the fruit, mucronate; fruit roundish, oval, gibbous, curved outwards, beaked; stigmas three; leaves very broad." β . *C. cylindracea*. "Spikes cylindrical, thickish; males several; bractes foliaceous, broad, and long." γ . *C. triticea* (*C. clavata*, Thunb. Prod. p. 14.) "Spikes oval, very thick, male at the top; glumes as long as the fruit, a little cuspidate." A native of the Cape of Good Hope. 116. *C. flava*, Linn. Sp. Pl. 18. Mart. 21. Lam. 28. Wahlen. 61. Eng. Bot. 1294. Flor. Dan. tab. 1047. Leers, tab. 15. fig. 6. (*Gramen palustre echinatum*, Rai Syn. p. 421. n. 18. Ger. Em. 17. G. cyper. Morif. § 8. tab. 12. fig. 19.) Marsh hedgehog grass. "Bractes sheaths short, nearly the length of the peduncles; female spikes roundish; fruit beaked, curved downwards; stem nearly smooth." *Root* perennial, creeping. *Stem* often a foot high, erect, leafy below, triangular; angles generally smooth and even, sometimes a little rough. *Leaves* bright green, erect, rather broad, flat, longer than the stem, rough on the edges and on the keel, marked with two rough lines on their upper side towards the extremity. *Bractes* foliaceous, much longer than the stem; upper ones spreading, deflexed, with a very short sheath; the lowest with a longer sheath, and less spreading. *Male spike* lanceolate, erect, dense, very seldom more than one; female about three, roundish, egg-shaped, spreading; upper ones generally near together, most commonly sessile; lowest more remote, peduncled; peduncle a little shorter than the sheath; glumes egg-shaped, tawny, with a green rib. *Fruit* longer than the glumes, spreading every way, egg-shaped, inflated, smooth, ribbed, cloven at the tip, triangular; angles not at all rough; stigmas three. *Seed* small, triangularly-inversely egg-shaped, black. Common in boggy meadows, flowering in May and June. 117. *C. oederi*, Oeder, Roth, Hoffmann. Ehrh. Willd. Schkuhr 35. tab. f. (*C. flava*, β *flavescens*, Wahlen. *C. extensa*, Relh. Flor. Cant.) "Bractes rather distant; fruit oblong-inversely egg-shaped, a little inflated, with a short awl-shaped beak, not recurved; orifice two-toothed; stem obtusely angular; leaves narrow, the lower ones the longest, incurved at the edges." Wahlen. Common near Yarmouth. Mr. Dawson Turner observes (see Botanists Guide, vol. ii. p. 75.), that he can find no satisfactory marks of distinction between this and the preceding species, and yet it is so constant in its appearance, in all situations, whether wet or dry, that though Schkuhr is inclined to consider it only as a variety of *flava*, he cannot but believe it distinct. He adds, that Mr. Brunton pointed out to Dr. Smith the same leading distinction as was noticed by Dr. Roth, the fruit expanding in all directions, and not at all recurved. Mr. Turner suspects that it has been mistaken by many British botanists for the much more rare *C. extensa*. 118. *C. extensa*, Mart. 80. Gooden. 25. Linn. Transf. vol. ii. tab. 21. fig. 7. Smith 33. Wahlen. 65. Eng. Bot. 833. Sch. tab. X x. fig. 72. (*Cyperoides echinatum majus*, Dill. in Rai Syn. 421.) "Bractes sheaths and peduncles very short; bractes very long; female spikes roundish; fruit egg-shaped; stem smooth." *Root* perennial, fibrous. *Stem* near a foot high, erect, or ascending, sometimes curved, obscurely tri-

angular, perfectly smooth. *Leaves* narrow, recurved, channelled, rough at the edges towards the point. *Bractes* foliaceous, very long, curved; sheaths dilated, very short. *Male spike* generally solitary, lanceolate, bluntish, sometimes with a few female flowers in the lower part. *Female* two or three, near together, almost sessile, erect, egg-shaped, rarely cylindrical, finally roundish; glumes all broad egg-shaped, three-nerved. *Fruit* longer than the glumes, erect, but a little spreading, egg-shaped, ribbed, smooth at the edges, and every where destitute of pubescence; stigmas three. *Seed* triangular, gibbous. A rare native of the sea-coast, flowering in June. 119. *C. fulva*, Mart. 81. Gooden. 26. Linn. Transf. vol. ii. tab. 20. fig. 6. Smith 32. Wahlen. 62. Eng. Bot. 1295. Sch. 86. fig. 67. "Bractes sheaths long, but shorter than the peduncle; female spikes egg-shaped; fruit beaked, straight; stem rough." *Root* perennial, creeping. *Stem* near a foot high, erect, slender, triangular; angles at least near the top acute, and very rough. *Leaves* upright, narrow, shorter than the stem, rough at the edges and on the keel, but not on the upper side. *Bractes* foliaceous, upright, shorter than the stem; sheaths long, brownish at the tip. *Male spike* linear, erect, dense, many-flowered; glumes egg-shaped, obtuse, membranous, and white at the edge, with an obscure nerve of the same colour. *Female* two, rarely three, egg-shaped, erect, rather remote, peduncled; peduncles about half as long again as the sheaths; glumes egg-shaped, brown, somewhat membranous at the edge, never awned, with a pale obscure nerve. *Fruit* longer than the glumes, brownish-green, pointing upwards (not recurved), beaked, smooth, except at the edges of the beak, cloven at the top; stigmas three. *Seed* yellowish-brown, twice as large as that of *C. flava*. It is distinguished from the next species by its rough stem, glumes without awns, and longer-beaked, rough-edged fruit. A native of marshy ground, flowering in June and July. 120. *C. difflans*, Linn. Sp. Pl. 33. Mart. 39. Lam. 47. Wahlen. 63. Flor. Dan. 1049. Eng. Bot. 1234. Sch. 87. tab. T. and Yy. fig. 68. (Hall. Helv. n. 1382. Rai Syn. 420. n. 16.) "Sheaths elongated, nearly as long as the peduncles; spikes oblong, very remote; glumes pointed; stem smooth." *Root* perennial, fibrous. *Stem* from 12 to 18 inches high, nearly upright, weak, bluntly triangular, or rather flattened on one side only, smooth, except sometimes near the top. *Leaves* short, rather broad, flat, rough at the edges. *Bractes* similar to the leaves, remote; sheaths moderately long, almost entirely concealing the peduncles. *Male spike* lanceolate, obtuse; glumes inversely egg-shaped, obtuse, sharply keeled, very slightly pointed. *Female spikes* two or three, seldom four, upright, oblong, egg-shaped, peduncled; lower peduncles half as long again as the sheath, upper ones about its length; glumes broad, of a rusty hue, tipped with a short point; keel three ribbed. *Fruit* longer than the glumes, egg-shaped, brown, smooth, with many uniform ribs, and a short cloven beak; stigmas three. *Seed* triangular, brown, appearing granulated, under a high magnifier. A native of marshes, chiefly near the sea, flowering in June. 121. *C. binervis*, Smith. Linn. Transf. vol. v. p. 268. Smith. Flor. Brit. 35. Eng. Bot. 1235. Wahlen. 97. (*C. difflans*, Lightf. 561.) "Sheaths elongated, shorter than the peduncles; spikes cylindrical, remote, often compound; glumes pointed; fruit with two principal ribs." Larger than the preceding, for which it has been mistaken by many botanists. *Stem* a foot and a half, sometimes three feet high, erect, firm, bluntly triangular, smooth, except towards the top. *Leaves* upright, broadish, acuminate, rather glaucous, rough at the edges, and on the keel. *Bractes* resembling the leaves, elongated, upright, remote, with rather long sheaths. *Male spike* attenuated both ways, often an inch and half

half long; glumes densely imbricated, elliptical, obtuse, with a short point, blackish; keel sharp, green. *Female spikes* three or four, rarely five, cylindrical, erect; lower ones very remote, on longer peduncles, and often compound or branched at the base; all of them sometimes with male flowers at the top; glumes egg-shaped, black, pointed; keel green, smooth, except at the point. *Fruit* longer than the glumes, egg-shaped, scarcely beaked, smooth, shining, purplish within and at the tip, pale without, with two principal green ribs, besides several small ones running longitudinally at some distance from the margin; stigmas three. Common in many parts of England and Scotland, but not generally understood, flowering in June. 122. *C. fernalis*, Wahlen. 66. Willd. Schkuhr, tab. S. fig. 65. "Spikes broad lanceolate; peduncles sheathed; bractes long, foliaceous, lower ones very remote; sheaths short; fruit oblong, with a long acuminate beak, convex on one side, a little concave on the other, pressed close, ferrate-ciliated at the edges; orifice bifid; stigmas three." A native of Austria. 123. *C. heterosperma*, Wahlen. 67. "Spikes somewhat thread-shaped, straight; flowers scattered; peduncles sheathed; bractes foliaceous, long, remote; fruit oval-ventricose, elongated at the base, attenuated at the top, curved outwards; orifice quite entire; stigmas three." A native of North America. 124. *C. juncea*, Mart. 91. Scop. Carn. n. 1163. Mich. Gen. 58. n. 19. "Spikes very remote; male longer than the females, which are nearly sessile; fruit cloven, triangular, smooth; seed triangular." *Stem* a foot high. *Leaves* scarcely two lines broad. Upper female spike sometimes with male flowers at the tip; lower with a leaf longer than the spike. 125. *C. panicea*, Linn. Sp. Pl. 30. Mart. 35. Lam. 57. Wahlen. 96. Schkuhr 93. tab. L. l. fig. 100. Eng. Bot. 1505. "Sheaths elongated, about half the length of the peduncles; female spikes rather loose, distant; fruit inflated; stem smooth." *Root* perennial, creeping. *Stem* from 10 to 15 inches high, erect, obtusely triangular, smooth. *Leaves* glaucous, short, rather erect, rough at the edges and top of the keel. *Bractes* foliaceous, acute, shorter than the stem; sheaths long, furrowed, pale, or yellowish. *Male spikes* one or two, lanceolate, acute, dense; glumes rusty brown, obtuse, various in breadth, with a green keel. *Female spikes* generally two, sometimes with male flowers at the top, remote, erect, on slender peduncles twice as long as the sheaths; glumes loosely imbricated, egg-shaped, rusty brown, acute, awnless, membranous at the edge, with a green keel; stigmas three. *Fruit* egg shaped, longer than the glumes, inflated, bluntish, entire, smooth, obscurely ribbed, of a light greenish, or yellowish hue. *Seed* short, triangular, brown, frequently infested with the disease called smut, which turns it into sooty dust. Dr. Smith. A native of moist ground, flowering in May and June. 126. *C. recurva*, Mart. 70. Hudson p. 413. 2. Ed. Flor. Dan. 105. Eng. bot. 1506. (*C. glauca*; Scop. Carn. v. 2. 223. Pollich v. 2. 594. *C. limosa* β ; Leers 201. tab. 15. fig. 3. *C. flacca*; Wahlen. 115. Schreb. Schkuhr 98. tab. O. P. ag. 57. a. b. Gram. cyp. foliis caryophyllis, spicis pendulis; Rai Syn. p. 418. n. 5. Morif. §. 8. tab. 12. fig. 14.) "Sheaths short; female spikes cylindrical, pendulous; fruit elliptical, triangular, roughish; root creeping." *Root* perennial, sheathed with brown scales. Whole herb glaucous. *Stem* from eight to eighteen inches high, erect, convexly triangular, rough upwards. *Leaves* shorter than the stem, erect, broadish, flat, rough-edged. *Bractes* foliaceous, erect, nearly as long as the stem; sheaths short, with a small appendage on each side. *Male spikes* various, mostly solitary, sometimes two perfectly distinct and both peduncled, when solitary often compound, with one or two

spikelets, sessile at its base; glumes inversely egg-shaped, blunt, brown with a pale keel. *Female spikes* two or three; sometimes with male flowers at the top, the upper one sometimes nearly sessile, the next on a longish peduncle, the lowest often on a very long one springing from the very bottom of the stem, all at first erect, afterwards pendulous, cylindrical, very dense; glumes egg-shaped, somewhat pointed, blackish, with a white edge and yellowish nerve; stigmas three. *Fruit* imbricated, elliptical, bluntly triangular, swelling, entire, more or less downy or rough, of a rusty green, soon becoming black. *Seed* short, triangular. Common on moist ground, flowering in May and June. 127. *C. ustulata*, Wahlen. 92. (*C. atrofusca*; Schkuhr 90. tab. Y. fig. 82.) "Spikes oval; peduncles naked, curved backwards; bractes loosely sheathing, scarcely foliaceous, distant; fruit oval, acuminate, flattish on both sides, acutely angular, beaked, black; orifice two-toothed; stigmas three; male spike oblong, recurved. A native of mountains in Sweden, and Iceland. 128. *C. latifolia*, Wahlen. 94. Schkuhr 78. tab. M. fig. 49. "Spikes very narrow, rather loosely flowered; peduncles partly-naked; bractes scarcely foliaceous, remote; sheaths very long; fruit elongate-egg-shaped, triangular, curved outwards at the tip, quite entire; stigmas three, leaves very broad. A native of Virginia, in the herbarium of Thunberg. 129. *C. pilosa*, Wahlen. 95. Schkuhr 78. tab. M. fig. 49. "Spikes linear, loosely flowered; peduncles naked; bractes sheathing, foliaceous, remote; fruit somewhat oval, acute; orifice transparent, two-lobed; stigmas three; leaves ciliated." A native of Moravia. 130. *C. limosa*, Linn. Sp. Pl. 27. Mart. 32. Lam. 43. Smith 27. Gooden. 34. Wahlen. 122. Schkuhr tab. T. t. fig. 107. Flora dan tab. 646. (*Cyperoides spica pendula, brevior, squamis e spadiceo vel fusco rutilante viridibus*; Scheuchz. Agr. 443. tab. 13. fig. 13.) "Sheaths very short, scarcely any; female spikes egg-shaped, pendulous; fruit elliptical, compressed; root creeping." Dr. Smith. *Root* perennial, throwing out suckers; fibres clothed with a thick down. Whole herb rather glaucous. *Stems* ascending, scarcely a foot high, triangular, striated, rough, leafy at the base. *Leaves* linear, narrow, flat, shorter than the stem, rough at the edges, sheathed at the base with brown scales. *Bractes* erect, resembling the leaves but smaller; sheaths brown, slightly emarginated, membranous and white at the edge. *Male spike* terminal, erect, lanceolate, reddish brown; glumes egg shaped, acute." *Female* one or two, peduncled, drooping, finally pendulous, egg-shaped, many-flowered, dense, handsome; glumes broadly elliptical, somewhat pointed, green at the back, deep gold-coloured at the edge; peduncles very long, triangular, smooth. *Fruit* imbricated, a little longer than the glume, elliptical, compressed, ribbed, smooth, entire, scarcely beaked; stigmas three. *Seed* elliptical, triangular, a little compressed, brown. A native of turfy bogs in England, and other parts of Europe. 131. *C. laxa*, Wahlen. 93. "Spikes oblong-elliptical, rather densely flowered, pendulous; peduncles naked; bractes foliaceous, rather narrow, remote; sheaths rather long; glumes obtuse, as long as the fruit; fruit oblong-elliptical, rather obtuse, triangular, depressed; angles obtuse; orifice very entire; stigmas three; stem flaccid. A native of the turfy borders of lakes in Lapland. *Female spikes* similar to those of the preceding species. 132. *C. caespitosa*, Linn. Sp. Plan. 34. Mart. 38. Smith 42. Wahlen. 139. Eng. bot. 1507. Schkuhr 48. tab. B. b. fig. 85. c. d. (Gram. caryophylleum; Will. in Rai Syn. p. 418. n. 6.) "Digitary; bractes auricled, not sheathing; spikes sessile, cylindrical, obtuse; fruit permanent." *Root* creeping, but short, forming

forming dense, entangled tufts. *Stems* from nine to twelve inches high, erect, acutely triangular, roughish upwards. *Leaves* erect, almost as tall as the stem, narrow, acute, of a bright not glaucous green, rough at the edges and keel. *Bractes* like the leaves, but much smaller, without any sheath, accompanied at the base by a pair of round black auricles, which are largest in the smaller bractes. *Male spike* almost always solitary, lanceolate, erect; glumes brown, obtuse, narrowish, with a green nerve. *Female spikes* two or three; crowded, sessile, erect, cylindrical, shortish, obtuse; glumes elliptical, obtuse, close, black, with a green nerve. *Fruit* elliptical, broad, compressed, ribbed, green, smooth, permanent after it is ripe; stigmas two. *Seed* compressed. Dr. Smith. A native of moist ground in Sweden and England. 133. *C. stricta*, Mart. 83. Gooden. 40. Linn. Transl. V. 2. tab. 21. fig. 9. Smith 43. Wahlen. 138. Schkuhr 49. tab. V. fig. 73. (*C. caespitosa*; Hudf. p. 412. Lightf. 561. β . *C. acuta*, and Leers 204. tab. 16. fig. 1. Hall. helv. n. 1400. on the authority of Davall. *C. elata*; Mart. 86. Allion. pedem. n. 2344. Gram. cyper. Rai Syn. p. 418. n. 4. Loeß. Pruff. 116. tab. 30.) "Digynous; bractes slightly auricled, not sheathing; spikes nearly sessile, cylindrical, elongated, acute; fruit deciduous." *Root* perennial, creeping. Whole herb rather glaucous, double the size of the preceding. *Stem* about two feet high, erect, sharply triangular; rough upwards. *Leaves* erect, straight, shorter than the stem, rough on the edges and keel; root-leaves embracing the stem, with sheaths split into threads after the manner of open network. *Bractes* similar to the leaves, sessile, erect, straight, accompanied at the base by two oblong auricles which soon disappear; sheath none. *Spikes* on short peduncles, erect, an inch and half or two inches long, linear-lanceolate, rather near together, very dense, many-flowered; all the glumes elliptic-lanceolate, obtuse, pressed close, black, with a green nerve; male spikes often two; females generally three, often with male flowers at the top; stigmas two. *Fruit* imbricated, egg-shaped, acute, compressed, ribbed, green, smooth, deciduous as soon as ripe. *Seed* similar to that of the preceding species. A native of marshy places in various parts of Europe. 134. *C. japonica*, Mart. 40. Lam. 51. Thunb. flor. japon. 38. "Spikes monoicous, peduncled, erect; female ones peduncled, egg-shaped; male terminal, linear." *Root* fibrous. *Stem* about seven inches high, leafy, triangular, erect, weak, smooth. *Leaves* alternate, sheathing, smooth, erect; lower ones shorter than the stem; upper ones over-topping it. *Male spike* terminal, linear, longer than the others. *Female spikes* two or three, erect, egg-shaped, furnished with bractes. A native of the island of Nippon, flowering in June. La Marck justly observes, that from this description the spikes are improperly said to be monoicous. 135. *C. plantaginea*, Lam. 49. "Male spike short, dark purple; female spikes remote, erect, slender; stem sheathed, leaves ribbed." *Root-leaves* in thick tufts, oblong-lanceolate, flat, about an inch broad, ribbed like those of plantane, purple at their base. *Stems* slender, straight, jointed, higher than the leaves, and furnished in all their length with numerous alternate, naked, pointed, purple sheaths, of which only the lower terminate in short leaves. *Male spike* more than half an inch long, terminal, oblong-egg-shaped, straight, nearly black or dark purple; glumes smooth, oblong-egg-shaped. *Female spikes* four or five, straight, very slender, distant from each other, on short peduncles which are partly concealed by the sheath; glumes loosely imbricated, smooth, membranous, acuminate, purplish at the tip. Supposed to be a native of South America; cultivated in the open air at Paris, where it flowers

early in the spring. 136. *C. laxiflora*, Lam. 50. "Female spikes filiform, axillary, erect; flowers distant; leaves flat." *Stems* in a tuft, from seven to nine inches high, leafy. *Leaves* alternate, straight, flat, like those of *juncus pilosus*, smooth, two or three lines broad; root-leaves shorter than the others. *Male spike* terminal, straight, pale or yellowish, scarcely an inch long; glumes lanceolate-egg-shaped, membranous. *Female spikes* three, an inch long, alternate, axillary, straight, filiform, peduncled; glumes alternate, distant, mucronate, membranous, whitish. A native of New York, Pennsylvania, and Virginia. 137. *C. prafna*, Wahlen. 118. "Spikes on rather short peduncles, linear, elongated at the base, loose; bractes partly embracing the stem, foliaceous, rather distant; glumes oval-elliptical, mucronate; fruit oblong, depressed, pointed; orifice two-toothed; stigmas three; stem acutely angular." A native of North America. 138. *C. leonura*, Wahlen. 120. "Spikes peduncled, slender, and tapering, zig-zag, nodding; bractes partly embracing the stem, foliaceous, distant, very long; glumes with a long diverging awn, fruit somewhat globular, pointed; orifice quite entire; stigmas three." A native of Pennsylvania. 139. *C. Chinensis*, Wahlen. 88. Mart. 93. Lam. 54. Retz. Obs. Fae. iii. p. 42. "Spikes erect; male terminal; female four, peduncled; fruit acuminate." *Stem* seven or eight inches high, triangular, smooth. *Leaves* longer than the stem, rough at the edges. *Female spikes* resembling those of the next species, but are upright, remote, solitary, more slender, and are each furnished with a slender bracte scarcely the length of the spike. A native of China. 140. *C. pseudo-cyperus*, Linn. Sp. Pl. 32. Mart. 37. Lam. 53. Wahlen. 117. Smith 26. Eng. Bot. tab. 242. Schkuhr 25. tab. M m. fig. 102. (Gram. Cyper. p. 419. n. 12. Morif. § 8. tab. 12. fig. 5.) "Bractes scarcely sheathing; spikes cylindrical, pendulous, many-flowered; fruit spreading, furrowed, beaked, cloven." *Root* perennial, fibrous. *Stem* a foot high or more, erect, leafy, sharply triangular; rough at the angles. *Leaves* pale green, sheathing, rough above, and at the edges. *Bractes* less than the leaves, and scarcely sheathing. *Peduncles* very long, triangular, slender, rough, sometimes two from a bracte. *Spikes* cylindrical, many-flowered, dense; male erect, red; female about four, on peduncles about their own length, greenish, at first erect, but soon pendulous; glumes egg-shaped, with long, very rough awns. *Fruit* spreading, lanceolate, triangular, ribbed, smooth, beaked, cloven; stigmas three. *Seed* elliptical, triangular, white. Not very uncommon in wet shady places, flowering in June. 141. *C. crinita*, Lam. 55. "Spikes long, bristly, rather pendulous; glumes bristly, several times longer than the fruit." *Stem* about two feet high, triangular, leafy. *Leaves* striated, long, three or four lines broad; upper stem ones longer than the stem. *Spikes* about five; male an inch and an half long, terminal, linear, with sometimes a few female flowers at the base; glumes narrow, linear-awl-shaped, yellowish or reddish; females near three inches long, alternate, axillary, peduncled, drooping; glumes very narrow, linear-bristle-shaped, ciliated, spreading, much longer than the fruit. *Fruit* roundish-egg-shaped, smooth, angular, slightly mucronate. A native of Virginia. 142. *C. Michx.*, Wahlen. 89. Hoff. Schkuhr 84. tab. P. and V v. fig. 59. (*C. ampullacea*, Wulfen.) "Spikes thickish, short; peduncles sheathed; bractes somewhat foliaceous, rather remote; glumes acuminate, as long as the fruit; fruit broad, inversely egg-shaped, with a rather long bicuspidate beak; stigma three." A native of Moravia. 143. *C. xanthophylla*, Wahlen. 73. "Spikes six-flowered, very thick; peduncles somewhat sheathed; bractes foliaceous, very remote;

note; fruit oblong-conical, inflated, beaked, diverging; orifice bifid; stigmas three. A native of North America. 144. *C. folliculata*, Linn. 31. Mart. 36. Wahlen. 74. Schkuhr 73. tab. N. fig. 52. Linn. Transf. vol. vii. tab. 9. fig. 4. (Gram. Cyp. Pluk. Mant. 96. tab. 419. fig. 1.) "Spikes terminal, peduncled, male and female; fruit awl-shaped, the length of the spike." *Stem* two feet high, triangular. *Leaves* narrow. *Male spike* terminal, oblong, peduncled, accompanied in the same axil by a female spike, consisting of seven or eight conic-awl-shaped, spreading, feed-vessels each as long as the spike itself, big with the feed, Linn. The figure in the Linnæan Transactions, taken from a specimen in the possession of Mr. Rudge, and corresponding with one in the herbarium of sir Joseph Banks, has two female spikes, as has also Plukenet's figure, quoted by Linnæus. Found by Kalm in Canada. 145. *C. intumescens*, Rudge in Linn. Transf. vol. vii. p. 97. tab. 9. fig. 3. (*C. folliculata*, Lam. 48? *C. lurida*, Wahlen.) "Female spikes few-flowered; fruit inflated, egg-shaped, with a long pointed beak." *Stem* erect, triangular; angles rather obtuse, smooth, but rough above the lower bractæ. *Leaves* longer than the stem, broad, dark green, rough at the edges and on the keel. *Male spikes* terminal, linear, on a long peduncle. *Female spikes* with loosely imbricated flowers on very short peduncles; glumes oblong-egg-shaped, acute, half the length of the fruit. *Fruit* oblong-egg-shaped, much inflated, erect, striated, with a long acute beak, cloven at the orifice; stigmas three. *Seeds* egg-shaped, triangular, smooth, acuminate, yellow. A native of Carolina. 146. *C. pendula*, Mart. 87. Hudf. p. 411. Gooden. 20. Smith 21. Curtis Flor. Lond. tab. 63. Schkuhr 85. tab. Q. fig. 60. (*C. agastachys*, Linn. jun. Supp. 414. Ehrh. Phyt. n. 19. Wahlen. 76. *C. maxima*, Lam. 56. Scop. Carn. ii. n. 1166. Allion. Flor. Ped. n. 2341. Hall. Helv. n. 1396. Gram. Cyp. Rai Syn. p. 420. n. 13. Morif. § 8. tab. 12. fig. 4. Barel. Icon. tab. 45.) "Sheaths elongated, nearly the length of the peduncle; spikes cylindrical, very long, nodding; fruit crowded, egg-shaped, acute." *Root* perennial, fibrous. *Stem* from three to six feet high, erect, firm, leafy, smooth, triangular; angles roughish towards the top. *Leaves* broad, deep green, rigid, hard, rough at the edges and on the keel, rather glaucous underneath. *Bractes* foliaceous; lower ones very long, hanging down in a curve, sheathing; sheaths nearly the length of the peduncles. *Spikes* from five to seven, peduncled, curvilinearly pendulous, cylindrical, many-flowered, very dense; the highest male, sometimes with female flowers at the top; the rest commonly female; glumes lanceolate, acuminate, brown, with a green keel. *Fruit* egg-shaped, triangular, rather inflated, smooth, beaked, at length emarginate; stigmas three. *Seed* triangular, brown. A native of woods and moist hedges in many parts of Europe, flowering in May and June. 147. *C. strigosa*, Mart. 88. Hudf. p. 411. Gooden. 21. Smith 22. Eng. Bot. 994. Schkuhr 30. tab. N. fig. 53. (*C. leptostachys*, Mart. 92. Linn. Sup. 414. Ehrh. Phyt. n. 48. Wahlen. 68. Gram. Cyp. Rai Syn. p. 419. n. 11.) "Sheaths elongated, nearly equal to the peduncle; spikes filiform, loose, a little drooping; fruit lanceolate, triangular, ribbed." *Root* perennial, fibrous. *Stem* two feet high, erect, slender, leafy, triangular, smooth. *Leaves* light green, broadish, thin, rough on the edges and keel. *Bractes* like the leaves, shorter than the stem; sheath nearly as long as the peduncle, crowned by a tubular membrane. *Spikes* six or eight, peduncled; the highest male, the rest female; glumes lanceolate, greenish. *Fruit* lanceolate, triangular, acute, ribbed, smooth, green; stigmas three. *Seed* elliptical, triangular. A native of woods and hedges in several

parts of England, but not common, flowering in April and May. 148. *C. sylvatica*, Mart. 89. Hudf. p. 411. Gooden. 31. Smith 23. Flor. Dan. 404. Eng. Bot. 995. Schkuhr 94. tab. L. I. fig. 101. (*C. vesicaria*, β. Sp. Pl. *C. drymeia*, Linn. jun. Sup. p. 414. Ehrh. Phyt. n. 58. Wahlen. 79. *C. patula*, Lam. 45. Pollich. v. ii. 597. *C. capillaris*, Leers 202. tab. 15. fig. 2. Hall. Helv. n. 1395. Gram. Cyp. Rai Syn. p. 419. n. 10. Morif. § 8. tab. 12. fig. 9.) "Sheaths half the length of the peduncle; spikes slender, a little loose, drooping; fruit egg-shaped, triangular, beaked." *Root* perennial, fibrous. *Stem* two or three feet high, erect, leafy, smooth, convexly triangular. *Leaves* bright green, rough above, very rough on the edges and keel. *Bractes* like the leaves, with longer sheaths. *Spikes* six or eight, soon drooping, slender, rather loose; one, rarely two, male; all with slender peduncles more than half the length of the sheath; glumes egg-shaped, acuminate, membranous, white, with a rough green keel. *Fruit* egg-shaped, triangular, with a long beak, smooth, emarginate at the tip; stigmas three. *Seed* triangular, brown. It is distinguished from the preceding by the structure of its fruit, which has three prominent angles, but no intermediate ribs, and ends in a long cloven beak. Linnæus made it only a variety, and has celebrated its utility to the Laplanders, who use it carded and dressed as a wadding to protect them from cold. Common in woods and thickets, flowering in May or June. 149. *C. depauperata*, Mart. 85. Gooden. 30. Wahlen. 86. Smith 24. Eng. Bot. 1098. (*C. ventricosa*, Curt. Flor. Lond. tab. 68. *C. triflora*, Willd. Phytog. tab. 1. fig. 2. Cyperoides, Morif. tab. 32. fig. 5. *C. vesicarium humile*, locustis rarioribus, Tourn. Infr. 130. confirmed by his herbarium.) "Sheaths much shorter than the peduncles; female spikes distant, erect, few-flowered; fruit inflated, beaked." *Root* perennial, fibrous. *Stem* a foot and half high, erect, leafy, obscurely triangular, striated, smooth. *Leaves* with long sheaths, pale green, rough on the edges and keel. *Bractes* like the leaves, but with shorter sheaths which closely unfold the slender peduncles of the female spikes, sometimes for a third part of their length, and sometimes for more than half. *Male spike* terminal, erect, many-flowered, linear, closely imbricated; glumes elliptical, rust-coloured, with a white membranous edge and a green keel. *Female spikes* from three to five, remote, loose, erect; peduncles triangular, rough; flowers from two to four or five, erect; glumes inversely egg-shaped, pointed, with a green keel. *Fruit* egg-shaped, triangular, ribbed, smooth, rather long-beaked, with a membranous nearly entire orifice, finally becoming inflated; stigmas three. *Seed* inversely egg-shaped, triangular. A native of woods but rare, flowering in May and June. 150. *C. grisea*, Wahlen. 129. "Spikes on naked peduncles, with six loosely-set flowers; bractes sheathing, long, foliaceous, very remote; glumes cuspidate; fruit oblong-oval, triangular, rather acute; orifice quite entire; stigmas three. Native country unknown; preserved in the herbarium of Swartz. 151. *C. valsefiata*, Wahlen. 87. Suter. Flor. helv. 2. n. 57. Schkuhr tab. B b b. fig. 117. "Spikes two-flowered at the base, male at the top; peduncles long, naked, flaccid; bractes sheathing, long, foliaceous, remote; the lowest radical; fruit broad, inversely egg-shaped, roundish, ending in a point; stigmas three; male spike flaccid; leaves narrow." A native of Switzerland. 152. *C. capillaris*, Linn. Sp. Pl. 28. Mart. 33. Lam. 44. Smith 25. Wahlen. 91. Schkuhr 82. tab. O. fig. 56. Flor. Dan. 108. Scop. Carn. tab. 59. (*Cyperoides alpinum*; Segui. Veron. vol. 3. tab. 3. fig. 1.) "Sheaths half the length of the peduncles; female spikes egg-shaped, rather

rather loose, drooping; fruit acuminate." *Root* perennial, fibrous. *Stem* erect, from three to five inches high, roundish, slender, striated, smooth. *Root leaves* sometimes not half the length of the stem, narrow, acute, flattish, rough on the edges towards the tip. *Male spike* erect, linear, of a silvery-brown colour, with about ten flowers. *Female spikes* two or three, nodding or pendulous, egg-shaped, short, with fewer flowers; all the glumes egg-shaped, brown, membranous and white at the tip. In an early stage of the inflorescence, all the spikes seem to proceed almost in an umbellate form from the sheath of a common bracteal leaf which involves half the length of the peduncles; but as the fructification advances, the stem elongates and each appears with its proper, but shorter, bracteal leaf and sheath. In this state it is figured in *Flora Danica*. *Fruit* egg-shaped, triangular, acuminate, a little inflated; stigmas three. *Seed* elliptical, acutely triangular. A native of mountains in Scotland and other parts of Europe, flowering in July and August. 153. *C. castanea*, Wahlen. 90. "Spikes thickish, short, rather densely flowered; peduncles long, naked, curved backwards; bractes loosely sheathing, foliaceous, distant; glumes short; fruit oblong, attenuated, somewhat diverging; orifice one-lobed; stigmas three; leaves hairy." A native of North America, preserved in the herbarium of Turner. 154. *C. flexilis*, Rudge. Linn. Tran. vol. 7. p. 98. Tab. 10. fig. 1. "Female spikes oblong-egg-shaped, pendulous; fruit egg-shaped, beaks acuminate." *Stem* feeble, triangular, smooth. *Leaves* shorter than the stem, erect, thin, hairy at the edges and on the keel. *Male spike* near an inch long, terminal, erect, slender. *Female spikes* three or four, on long peduncles, oblong-egg-shaped, finally pendulous, two near the summit of the stem; the others remote with longer bracteal leaves; glumes shorter than the fruit, egg-shaped, acute, hairy at the edge. *Fruit* oblong-egg-shaped, beaked, cloven; stigmas three, glandular. *Seeds* egg-shaped, triangular, smooth. A native of Newfoundland. 155. *C. tenuis*, Rudge in Linn. Tranf. vol. 7. p. 97. tab. 9. fig. 2.) "Female spikes filiform, loose, pendulous; fruit oblong, with a long-pointed beak." *Stem* slender, feeble, triangular, angles not rough. *Leaves* longer than the stem, pale green, hispid at the edges. *Male spike* terminal, erect, linear. *Female spikes* zig zag, about four, three near the top of the stem, the other remote; peduncles capillary; glumes oblong, smooth, acute, half the length of the fruit. *Fruit* oblong, with a long, slender, cloven beak; stigmas three. 156. *C. acuta*, Linn. Sp. Pl. 35. Mart. 41. Gooden. 43. Smith 44. Wahlen. 136. Schkuhr 50. tab. F f. fig. 92. b. (*C. gracilis*, Curt. Flor. Lond. tab. 6. Mart. 96. *C. verna* α ; Lam? Gram. cyperoides minus angustifolium; Rai Syn. p. 417. n. 2.) "Digynous; spikes filiform; drooping in flower, erect in fruit; fruit elliptical, obtuse, entire at the orifice." *Root* perennial, creeping far. *Stem* varying in length with the moisture of the situation, sometimes two feet high and more, drooping at the summit when in flower, afterwards becoming erect, acutely triangular; angles rough. *Leaves* bright green, erect, curved near the tip, rough on the edges and keel. *Spikes* nearly sessile, filiform, slender, elongated, dense, many-flowered; glumes oblong, acute, awnless, black with a white nerve; male spikes two or three; female three or four, often with female flowers at the top, the lower ones at length becoming peduncled; stigmas two, white. *Fruit* imbricated, elliptical, obtuse, compressed, ribbed, green, smooth, deciduous. *Seed* small, inversely egg-shaped, double-keeled, not triangular. Common on the banks of ditches and rivers, flowering in May. 157. *C. paludosa*, Gooden. 42. Smith 45. Eng. bot. 807. Wahlen. 127. Schkuhr

101. tab. O o. fig. 103. (*C. acuta*, Curt. Lon. tab. 61. Hudf. γ . Lightf. β . *verna* γ . Lam? Gram. cyperoides minus angustifolium, Dill. in Rai Syn. p. 418.) "Spikes cylindrical, rather obtuse, erect; the female with awn-pointed glumes; the male with blunt ones; fruit elliptical, emarginate." *Root* perennial, creeping far. Whole herb glaucous. *Stem* a foot and half or two feet high, erect, acutely and irregularly triangular; angles very rough. *Leaves* rather broad, erect, rough on the margin and keel. *Bractes* foliaceous, not sheathing, rarely auricled, sometimes longer than the leaves. *Spikes* cylindrical, bluntish, erect; male about three; glumes oblong, blunt, brown, shining, with a green keel; female about three, on short peduncles, often with male flowers at the top; glumes lanceolate, acute, often with a rough awn, brown, with a green keel; stigmas three. *Fruit* imbricated, elliptic-lanceolate, rather acute, ribbed, finally emarginate. *Seed* triangular. Common on the banks of rivers and ditches, flowering in May. 158. *C. riparia*, Curt. Flor. Lond. tab. 60. Gooden. 41. Smith 46. Wahlen. 126. Eng. bot. tab. 579. Schkuhr 102. tab. Q q. fig. 105. (*C. acuta*, Hudf. Lightf. *C. rufa*, Lam. 58. *Cyperoides aquaticum maximum*; Mich. gen. 57. n. 10. 11. tab. 32. fig. 67. Gram. cyper. cum paniculis nigris; Rai Syn. 417. n. 1. Morif. tab. 12. fig. 1.) "Spikes erect; males triangular; females cylindrical; glumes of both acuminate; fruit beaked, forked at the tip." *Root* perennial, widely creeping, thick. *Stem* three feet high, erect, firm, acutely triangular; angles very rough, cutting like a fine saw. *Leaves* broad, erect, deep green above, a little glaucous underneath, rough on the edges and keel. *Bractes* foliaceous, longer than the stem, a little sheathing; sheaths often with rounded, pale auricles. *Male spikes* from three to five, erect, triangular, acute, dark brown; glumes lanceolate, acuminate or awned, brown; with a keel of the same colour. *Female spikes* three or four, erect, more or less peduncled, cylindrical, often with male flowers at the top; glumes egg-shaped, lessening suddenly into a rough awn, brown with a palish keel; stigmas three. *Fruit* imbricated, rather spreading, egg-shaped, inflated, with many ribs and a short cloven beak. *Seed* triangular, small, white. Common on the banks of rivers, flowering in April and May. The last three species which appear to have been confounded by Linnæus and most other botanists, were first clearly distinguished, and their specific differences settled by Mr. Curtis. 159. *C. geminata*, Wahlen. 116. Schkuhr 53. tab. W. p. fig. 75. "Spikes in pairs, on long peduncles, cylindrical, pendulous; males several; bractes embracing the stem, foliaceous, long, distant; fruit ovate-globular, pointed; stigmas three." A native of New Zealand? Foster. 160. *C. Michxiana*, Smith. Linn. Tranf. vol. 5. p. 270. Flor. brit. 47. (*Cyperoides*, Mich. gen. 62. tab. 32. fig. 12.) "Spikes erect, cylindrical; female ones peduncled; all the glumes obtuse, awnless; fruit inversely egg-shaped, very obtuse." *Stem* erect, a foot or a foot and half high, triangular, striated, scarcely rough. *Leaves* erect, acuminate, rough at the edges, with a smoothish keel. *Bractes* foliaceous, erect, longer than the stem, scarcely sheathing, auricled at the base; auricles large, rounded, connate, brown, pale at the tip. *Spikes* cylindrical, rather obtuse, erect; males three or four, nearly sessile, slender; glumes very obtuse, awnless, glaucous-green, with a thin, membranous, white edge; females two, on long peduncles, rather thick, the upper one with male flowers at the top, the lower one sometimes compound at the base; glumes elliptical, very obtuse, awnless, brown, with a white membranous edge, and a yellowish blunt keel; stigmas three. *Fruit* much shorter than the

glumes, inversely egg-shaped, triangular, dilated, almost ribless, smooth, greenish, very blunt at the top, undivided. *Seed* triangular, short, brown, with pale angles, resembling that of *C. recurva*, to which it is nearly allied, but differs in its numerous male spikes, and in its fruit, which is very smooth, shorter than the glumes, compressed, and not at all gibbous. Found by professor James Beattie jun. near Aberdeen: before that time it had been observed only by Micheli, whose figure had long been a stumbling block to botanists. It has been found since in Yorkshire near Beverley and Ripon. 161. *C. levigata*, Smith. Linn. Transf. vol. v. p. 272. Flor. brit. 48. Eng. bot. 1887. Wahlen. 80. (*C. patula*, Link. Schkuhr 97. tab. Bbb, fig. 116. *C. æthiopica*, Schkuhr 91. tab. Z. fig. 83.) "Spikes cylindrical; female one peduncled; sheaths very long; glumes pointed; fruit triangular, with a cloven beak." *Root* perennial, fibrous. *Stem* erect, from two to four feet high, triangular, perfectly smooth, leafy below. *Leaves* erect, broadish, bright green, smooth, with long sheaths. *Bractes* foliaceous, erect, higher than the stem, acuminate, the upper ones rough at the edges, lower ones only at the tip; sheaths of the lower ones very long, but shorter than the peduncles; of the upper ones sometimes very short. *Spikes* cylindrical, elongated, acute, slender, erect; males often two, glumes lanceolate, acute, often pointed; females two or three, on long, capillary, very smooth peduncles; glumes lanceolate, pointed, rust-coloured, green on the back, rough at the point; stigmas three. *Fruit* longer than the glumes, lanceolate, triangular, a little spreading, ribbed, not inflated, green, smooth; lessening into a compressed, deeply cloven beak. *Seed* filling the tunic, triangular, short, brown, pedicelled. First found in Great Britain by Mr. Mackay, near Glasgow. It has since been gathered in various parts of England and Wales. Schkuhr had it from the Isle of Bourbon, and therefore named it, but as Dr. Smith observes, not happily, *æthiopica*. 162. *C. trifida*, Wahlen. 123. Cavanilles Icon. vol. v. tab. 465. "Spikes nearly sessile, somewhat lanceolate, very thick; males several; bractes partly embracing the stem, foliaceous, broad and long, rather distant; glumes rather long, truncate, retuse, with a long ciliated awn; fruit oblong-egg-shaped, two-toothed; stigmas three." A native of Falkland Islands. 163. *C. vesicaria*, Mart. 42. Lam. β. Linn. Sp. Pl. 36. Smith 49. Wahlen. 124. Flor. Dan. 647. Eng. bot. 779. Schkuhr 103. tab. S f. fig. 106. (*C. inflata*, Hudf. Lightf. Gram. cyper. Dill. in Rai Syn. n. 14. Morif. tab. 12. fig. 6. "Female spikes cylindrical, shortish, nearly sessile; sheaths none; fruit inflated, beaked, cloven." *Root* perennial, creeping. *Stem* erect, two feet high, triangular, with very sharp and rough angles. *Leaves* erect, bright green, narrow, acuminate, rough at the edges. *Bractes* foliaceous, higher than the stem, sessile, without sheaths. *Male spikes* from one to three, filiform, slender, acute; glumes linear-lanceolate, rather acute. *Female spikes* three or four, nearly sessile, rather spreading, cylindrical, about an inch long, obtuse; glumes lanceolate, or linear-lanceolate, acute, brown, with a green keel; stigmas three. *Fruit* thickly ranged in several rows, spreading, longer than the glumes, egg-shaped, acuminate, ribbed; inflated, very smooth, yellowish, and shining when ripe, cloven at the tip. *Seed* small, triangular, short, sessile, crowned with the long permanent style, deprived of its stigmas. A native of marshy ground, chiefly in mountainous countries, flowering in May. β. *C. plumbea*, Wahlen. "Spikes thick; bractes foliaceous, very long, a little remote; scales ovate-oblong, ending in a point longer than the fruit; fruit oval-ovate, acuminate; orifice forked." A native of Caucasus, in the herbarium of

Swartz. 164. *C. ampullacea*, Mart. 97. Gooden. 45. Smith 50. Wahlen. 125. Schkuhr 104. tab. T t. fig. 107. (*C. vesicaria*, Lam. 59. α. Hudf. Lightf. *C. rostrata*, Dr. Stokes in Withering Ed. 2. Sibthorp. Abbot. Gram. cyp. Rai Syn. p. 419. n. 9. Morif. tab. 12. fig. 8.) "Female spikes cylindrical, elongated, nearly sessile; sheaths none; fruit inflated, with a linear, cloven beak." *Root* perennial, creeping. *Stem* erect, sometimes two feet high, triangular; angles smooth below, rough above the lowest spike. *Leaves* erect, narrow, glaucous, acute, rough at the edges and on the keel near the tip. *Bractes* foliaceous, erect, narrow, the lowest often overtopping the stem; sheaths none. *Male spikes* two or three, rather remote, filiform, acute; glumes elliptic-lanceolate, blunt, brown, membranous at the edge, with a yellow keel. *Female spikes* two, rarely three, more than twice as long as those of vesicaria, and much more slender, blunt, lower ones on short peduncles; glumes more acute than those of the male; stigmas three. *Fruit* imbricated, spreading, longer than the glumes, almost globular, inflated, ribbed, smooth, yellowish, with a linear cloven beak. *Seed* small, elliptical, triangular, sessile, tipped with the long style. Common in Scotland and the northern counties, more rare in the south, flowering in May. 165. *C. rotundata*, Wahlen. 78. (*C. globularis*, Vahl. Schkuhr 71. tab. G g. fig. 93.) "Spikes on short peduncles, oval; bractes somewhat foliaceous, distant; sheaths very short; glumes nearly as long as the fruit, obtuse; fruit somewhat globular, shining, acuminate, somewhat two-lipped; stigmas three; stem round; leaves convolute." A native of sub-Alpine mountains in Lapland. 166. *C. pumila*, Mart. 44. Lam. 43. (Wahlen. 71. Thunb. Flor. Jap. 59. Schkuhr tab. Y y. fig. 112.) "Male spikes two, terminal, sessile; female two, peduncled, oblong, erect." *Stem* very short, scarcely any. *Leaves* linear, attenuated, convolute, smooth. *Male spikes* linear; the lower one half the length of the other. *Female spikes* smooth. *Fruit* smooth, inflated, egg-shaped, beaked; stigmas three. Scarcely to be distinguished from *C. vesicaria*, except by its almost total want of a stem, the spikes appearing to rise directly from the surface of the ground. A native of Japan. 167. *C. birta*, Linn. Sp. Pl. 37. Mart. 43. Lam. 61. Wahlen. 70. Smith 51. Eng. bot. 685. Schkuhr 105. tab. U u. fig. 108. (Gram. cyper. Rai Syn. p. 418. n. 7. Morif. tab. 12. fig. 10.) "Hairy; spikes short, cylindrical, remote, sheaths nearly as long as the peduncle; glumes awned; fruit hairy." *Root* perennial, creeping far, with downy fibres. *Stem* about two feet high, acutely triangular; angles rough. *Leaves* scarcely so tall as the stem, erect, flat, acuminate, most hairy underneath, rough at the edges; sheaths long, generally very hairy upwards, but in watery places they sometimes become smooth. *Bractes* like the leaves, as long as the stem; sheaths hairy, inclosing nearly the whole peduncle. *Male spikes* two, rather remote, unequal in size, lanceolate; glumes egg-shaped, pointed, brown, hairy on the outside, with a yellow keel. *Female spikes* three, remote, peduncled, erect, cylindrical, short, rather loose; glumes smooth, egg-shaped, with long awns, a broad membranous white edge and green keel. *Fruit* loosely imbricated, egg-shaped, acute, ribbed, hairy on both sides, somewhat beaked, deeply cloven; stigmas three. *Seed* inversely egg-shaped, triangular, tipped with the permanent style. Common in marshy ground; flowering in May and June. 168. *C. fasciculata*, Wahlen. 128. Link Flor. Luf. Schkuhr 99. tab. Z z. fig. 114. "Spikes nearly sessile, linear; males several; bractes partly embracing the stem, foliaceous, long; glumes elliptical, long; fruit oval, beaked, ciliated at the edges; orifice somewhat divided; stigmas

stigmas three." A native of Portugal. 169. *C. filiformis*, Linn. Sp. Pl. 23. Mart. 27. Smith. 52. Wahlen. 77. Schkuhr 69. tab. K. fig. 45. (*C. tomentosa*, Lightf. Hudson. *C. hirta*, Flor. dan. tab. 379. exclusive of the separate spike, which is *C. hirta*.) "Spikes egg-shaped; sheaths nearly as long as the peduncles; glumes pointed; fruit downy; leaves channelled, smooth." Root perennial, creeping. Whole herb smooth. Stem two feet high, erect, slender, round, smooth, rush-like, except towards the top, where it often has three rough angles. Leaves upright, straight, narrow, channelled, without any sharp keel, pointed, rough at the edge. Bractes like the leaves, overtopping the stem; sheaths short, but nearly as long as the peduncles, surmounted by small auricles. Male spikes two, rarely one, rather remote, unequal in size, lanceolate; glumes elliptic-oblong, rather acute, blackish, with a yellow nerve. Female spikes two, rarely one, rather remote, egg-shaped, erect; glumes like those of the male, but often slightly awned, smooth. Fruit imbricated, egg-shaped, ribbed, blackish, clothed with short, tawny down, ending in a short cloven beak; stigmas three, seed elliptical, triangular, terminated by the short style. Dr. Smith, to whom we are almost entirely indebted for the specific characters and descriptions of all the British species. A native of England and Scotland, but rather rare, flowering in June. 170. *C. gigantea*, Rudge in Linn. Transf. vol. vii. p. 99. "Male spikes round, erect; females larger, turgid, fruit inflated, globular, beaked, acuminate, spreading." Stem erect, striated, triangular, smooth. Leaves broad, dark green much longer than the stem, hispid at the edges and on the keel, ribbed; spaces between the ribs knotty. Male spikes three; two upper ones near together; lower one more distant; glumes densely imbricated. Female spikes three, far exceeding in size those of every other species; the upper one a little incurved, sessile; the others alternate, peduncled, pendulous; flowers loosely imbricated, divaricated; glumes oblong-egg-shaped, awned, keeled, white and tender at the edge, half as long as the fruit. Fruit globular, much inflated, striated, loosely imbricated, divaricated, beaked with a long awn; orifice with two teeth; stigmas three; seed triangular, smooth. A native of Carolina. 171. *C. paleacea*, Wahlen. 131. Schreb. in Muhlem. Aët. Americ. "Spikes cylindrical; males several; peduncles long, reclined; bractes partly embracing the stem, foliaceous, distant; glumes terminated by a long serrated point; fruit roundish, pointed; orifice emarginate; stigmas two; stem lax." A native of North America. 172. *C. maritima*, Wahlen. 132. Flor. dan. 704. Schkuhr tab. W. fig. 74. "Spikes on long peduncles, pendulous, cylindrical; males several; bractes partly embracing the stem, foliaceous, distant; glumes with long points; fruit nearly orbicular, pointed; orifice emarginate; stigmas two; leaves broadish." A native of the sea coast in Norway. 173. *C. cuspidata*, Wahlen. 133. "Spikes on shortish peduncles, oblong-cylindrical; bractes partly embracing the stem, foliaceous, somewhat distant, remote from the male spike; glumes with rather long points; fruit somewhat orbicular, pointed; orifice emarginate; stigmas two; leaves soft, a little incurved at the edges." A native of muddy shores in Norway. 174. *C. salina*, Wahlen 134. "Spikes on shortish peduncles, oblong-cylindrical; bractes partly embracing the stem, foliaceous, rather remote; fruit somewhat orbicular, rather large, pointed; orifice emarginate; stigmas two; leaves soft, incurved at the edges; sheaths very long, nearly equal." A native of the sea-coast of Norway. 175. *C. aquatilis*, Wahlen. 135. "Spikes on short peduncles, somewhat linear, thickened and club-shaped above; bractes partly embracing the stem, foliaceous, long, rather

remote; fruit somewhat lenticular, rather small, pointed; orifice quite entire; stigmas two; stem firm, obtusely angular; leaves stiff, incurved at the edges; the lowest sheath rather shorter." A native of the banks of rivers in Lapland. *β. nardifolia*. "Spikes nearly sessile, short; male linear; bractes foliaceous, distant; glumes rounded, rather thick, nearly as long as the fruit; fruit egg-shaped, flattish on both sides, rather acute; orifice protruded; leaves very narrow, somewhat convolute." A native of alpine marshes in Lapland. 176. *C. hispida*, Wahlen. 137. Schkuhr 51. tab. 8. fig. 64. "Spikes nearly sessile, cylindrical, very densely flowered; males several; bractes partly embracing the stem, foliaceous, long, rather remote; glumes as long as the fruit, mucronate; fruit inversely egg-shaped, hispid at the edges, with a somewhat two-toothed tip; stigmas two; leaves broad." A native of Barbary.

CAREX lithosperma; Linn. Syst. nat. See *SCLERIA FLAGELLUM*.

CAREX, in *Geography*, an island situate in the Persian gulf.

CAREY, HENRY, in *Biography*, a poet and musician, who, perhaps, among philosophers, men of science, and artists of the first class, may be deemed somewhat too facetious to be allowed a record here. But as he had the power of exciting mirth without profligacy, indecorum, or licentiousness, which none of his buffoon predecessors, such as Cornylye, Coryat, Tom Brown, Tom d'Urfy, George Alexander Stevens, &c. could do; we think that, at least as long as many of his works are still in use, he should not be plunged into the gulf of oblivion. For though he was not a deep musician, or a great poet, he had genius and abilities in both these arts sufficient to interest and amuse the public by his productions, if not in a sublime manner, yet in a way not disgraceful to himself, or his admirers. This being premised as an apology for the hero of this article, and for his biographers, we shall proceed to detail the principal events of his professional life.

Of his birth and parentage we know nothing; and of his education are only certain that he was not a regular bred musician. It has been said, indeed, that he had his first lessons from a German of the name of Witchinson Lexpert; that Roscigrave had been kind to him; and that he was, in some sort, a disciple of Gemminiani. But the result of all these instructions did not, as his friend Lampe, a man of truth, used to say, enable him to make a base to his own ballads.

Poor Carey has been under-rated by his biographers, in ranking him as a man of humour, a writer of ballads, and an inventor of melodies, below Tom D'Urfy. Carey's humour may sometimes be low, but it was never gross or immoral; and d'Urfy's was nothing else. For in the six volumes of "Pills to purge Melancholy," there is scarcely an innocent song to be found.

The first we hear of Carey was, that he produced two farces in the year 1715, one of which, *the Contrivances*, is said in the *Biographia Dramatica*, to be a very entertaining piece, which had good success in its day."

In 1730, it appears, that when *Miss Rafter*, afterwards the celebrated Mrs. Clive, first appeared on the stage of Drury-Lane as a singer, it was at the benefit of *Harry Carey*, who seems to have been her singing-master. The manner in which this benefit was announced in the *Daily Post*, December 3d, is so singular that we shall transcribe the paragraph for the amusement of our readers. After naming the play, which was *Greenwich Park*, and the additional entertainments of singing; particularly a dialogue of Purcell by Mr. Carey and Miss Rafter, and a cantata of Mr. Carey's by Miss Rafter, there is an apology from Carey, for "the tra-

gedy of half an act" not being performed; but a promise is made of indemnification by the entertainments between the acts. The editor of the paper then adds; "but at our friend Harry Carey's benefit to-night, the powers of music, poetry, and painting, assemble in his behalf, he being an admirer of the three sister arts: the body of musicians meet in the Haymarket, whence they march in great order, preceded by a magnificent moving organ, in form of a pageant, accompanied by all the kinds of musical instruments ever in use from Tubal Cain to this day; a great multitude of booksellers, authors, and printers, form themselves into a body at Temple-bar, whence they march with great decency to Covent-garden, preceded by a little army of printers' devils, with their proper instruments: here the two bodies of music and poetry are joined by the brothers of the pencil; when, after taking some refreshment at the Bedford Arms, they march in solemn procession to the theatre, amidst an innumerable crowd of spectators."

Poetry and music, in high antiquity, formed but one profession, and many have been the lamentations of the learned that these sister arts were ever separated. Honest Harry Carey and Jean Jaques Rousseau are the only bards in modern times who have had the address to reconcile and unite them. The *Honest Yorkshireman* of Carey and the *Devin du Village* of Rousseau are indisputable proofs that popular strains, at least, if not learned and elegant music, may be produced by the writer of a dramatic poem. Carey, without musical learning, invented many very pleasing and natural melodies, which neither obscured the sense of the words, nor required much science to hear. But either from the ambition of the singer, or expectations of the audience, music is not suffered to remain simple long upon the stage; and the more plain and ancient the melodies, the more they are to be embellished by every new performer of them. The tunes in the *Beggar's Opera* will never appear in their original simple garb again.

In 1732, he produced the words of two serious operas; *Anelia* and *Teraminta*. The first of these was set by Lampe, and the second by the late Mr. Smith, Handel's disciple, friend, and successor, in superintending the performance of oratorios.

In 1734 his mock tragedy of half an act, called *Chrononkotonologos*, was first performed at the little theatre in the Haymarket; a piece of humour that will always be in season, as long as extravagance and bombast shall dare to tread the stage.

In 1736, and for several subsequent years, his little English opera, entitled *The Honest Yorkshireman*, was almost always in constant run.

The year 1737 was rendered memorable at Covent garden theatre by the success of the burlesque opera of the *Dragon of Wantley*, written by Carey, and set by Lampe, "after the Italian manner." This excellent piece of humour had run twenty-two nights, when it was stopped, with all other public amusements, by the death of her Majesty Queen Caroline, November 20th, but was resumed again on the opening of the theatres in January following, and supported as many representations as the *Beggar's Opera* had done, ten years before. And if Gay's original intention in writing his musical drama was to ridicule the opera, the execution of his plan was not so happy as that of Carey; in which the mock heroic, tuneful monster, recitative, splendid habits, and style of music, all conspired to remind the audience of what they had seen and heard at the lyric theatre, more effectually than the most vulgar street tunes could do; and much more innocently than the tricks and transactions of the most abandoned thieves and prostitutes. Lampe's music

to this farcical drama, was not only excellent fifty years ago, but is still modern and in good taste.

In 1738 *Margery, or the Dragonefs*; a sequel to the *Dragon of Wantley*, written with equal humour, and as well set by Lampe, came out; but had the fate of all sequels. When the novelty of a subject is faded away, and the characters have been developed, it is difficult to revive the curiosity of the public about persons and things of which opinions are already formed. The *Dragonefs* appeared but few nights, and was never revived.

Nancy, or the parting Lovers, was produced after these, and likewise set by Lampe; but the occasional songs and cantatas which he wrote and set to music himself, are innumerable. His burlesque birth-day ode, turned the odes of Cibber into ridicule as effectually as Pope's Dunciad could do. And his ballad of *Sally in our Alley*, had the honour of being praised by Addison for the poetry, and Geminiani for the tune. But though poor Carey was a successful poet and musician, he was always indigent and heavy on the hands of his friends. He seems to have been professionally active, he taught music at small boarding schools and private houses upon low terms, and had no particular vice or extravagance laid to his charge; but whether his embarrassed circumstances, domestic unhappiness, the malignity of rival but less successful writers, or from whatever cause, in a fit of insanity or despondency, Oct. 4, 1743, at his house in Warner Street, Cold bath fields, he terminated with a cord a life which he had innocently, and not uselessly, spent.

This precise date of his fatal catastrophe totally invalidates the claims that have been made of late by his son for the honour of having written and set the royal and national song, at the time of the rebellion in 1745, *God save great George our King!* which we have cogent reasons to believe was written for king James II. while the prince of Orange was hovering over the coast. And when he became king, who durst own or sing it? We are certain, that in 1745, when Dr. Arne harmonized it for Drury lane theatre, and C. B. for Covent-garden, the original author of the melody was wholly unknown.

CAREY's, *chicken*, or *goose*, *Mother*, in *Ornithology*. See *PROCELLARIA gigantea*.

CARFA, in *Geography*, a town of Arabia; 176 miles N.W. of Jamama.

CARFAGNANO, or CASTEL-NUOVO DI CARFAGNANO, a town of the duchy of Modena, and capital of a lordship, which is partly in the Modenese, partly in the Bolognese, and partly in the republic of Lucca; 18 miles N. of Lucca, and 37 S.S.W. of Modena.

CARGADORS, a name given by the Dutch to a kind of brokers, who make it their sole business to find freight for ships which want lading, and vessels for merchants or passengers who want conveyance to such or such a place.

CARGO, the lading or freight of a ship. See *FREIGHT*.

CARGO, *portable*, is that which contains something of every sort necessary to furnish the tradesmen of the place it is sent to, with parcels fit to fill their shops, and invite their customers. Officers and sailors on board a vessel are allowed to carry a small cargo, or "pacotille," not exceeding a certain bulk or weight, for their own account, without paying any freight.

CARGO is sometimes also used for an invoice of the goods wherewith a ship is laden. See *INVOICE*.

CARGO also denotes a weight used in Spain and Turkey, amounting to about 300 English pounds.

CARGOU, in *Geography*, a small island in the Persian gulf, near the coast of Farsistan.

CARHAIX,

CARHAIX, a town of France, in the department of Finistère, and chief place of a canton in the district of Châteaulin, seated on the Yer, in a fruitful country, that feeds great numbers of cattle, with plenty of game; $6\frac{1}{2}$ leagues S. of Morlaix. The place contains 1734, and the canton 13,464 inhabitants; the territory comprehends $32\frac{1}{2}$ kilometres and 9 communes.

CARHAM, a village of England, in the county of Northumberland, which deserves notice on account of the singular events that have occurred in its vicinity. Near this place a battle was fought between the English and the Danes, in which 11 bishops and 2 English counts were slain, besides a great number of soldiers. Here likewise was fought, in 1018, a battle between the English and the Scots, in which the latter were victorious. In the 24th year of Edward I. an abbey was burned here by the Scots, under the command of Wallace; and in the 44th year of Edward III. 1370, sir John Lilburn was defeated near this place by the Scots, under the command of sir John Gordon, and taken prisoner with his brother. Carham is distant 5 miles E. of Kelso, and 28 N.W. of Alnwick.

CARIA, in *Ancient Geography*, a province of Asia, occupying the south-western part of Asia Minor, or Anatolia. It is bounded on the north by Ionia, Lydia, and the river Mæander, which separated it from Ionia; on the east by Great Phrygia and part of Lycia, its natural boundaries being high mountains; and on the south and west by the sea. Geographers, however, are not agreed about its precise limits. Their different opinions may be seen in Cellarius's *Ancient Geography*. This country was for some time called Phœnicia, because the Phœnicians had considerable establishments in it; but it is said to have taken the name of Caria from Car, the brother of Lydus; and it comprehended a small province, forming a kind of peninsula towards the south-west, called *Doris*, which see. The interior of this country presents some chains of mountains; the chief of which were Latmus, on the west towards Miletus, and the Montes Calindici, towards the south-east near Calinda. The principal towns of Caria were Miletus, Myndus, Halicarnassus, Ceramus, Bergasa, and Cnidus, which were situated along the western coast. The Rhodians possessed a part of this country towards the south, under the name of *Pæra*, which see. In the interior of the country are found Alabanda, Apollonia, and Antiochia ad Mæandrum, Aphrodisias, Stratonice, Alinda, Pedasus, and, towards the south, Caminus, Calinda, &c. Caria was less cultivated than it might have been, because the inhabitants employed themselves very much in maritime concerns. Its mountains, however, furnished numerous flocks, and its wool was held in high estimation.

The Carians claimed the honour of being aborigines, (though some authors ascribe their origin to the Pelasgi, and others to the Cretans), and traced their name and origin to Car, the brother of Lydus and Mysus; and they thought this genealogy was confirmed by the antiquity of the temple of Jupiter the Carian, built at Mylasæ, where, from time immemorial, they assembled in common with the Lydians and Mysians. Hence they concluded that they had the same ancestors with these people, according to the report of Herodotus. Homer, says Stephanus Byzantinus, represented the Carians as barbarians, because they were enemies to the Ionians; but the epithet *βαρβαρικοῦς*, which this ancient poet applies to them, shews, that he referred to their language, and not to their political conduct. The Carians multiplied themselves to such a degree under the government of the descendants of Car, that they extended their establishments to the neighbouring islands. Accordingly they took

possession of the isle of Rhodes, belonging to the Phœnicians; and thus the access of this warlike nation to the other islands of the Ægean sea was facilitated. Thucydides says, that Minos II. drove the Carians from the islands of the Cyclades; but Herodotus informs us, that Minos allowed them the possession of these islands, together with unmolested liberty to cultivate them, and an exemption from tribute, on condition of their furnishing his fleet with a number of vessels. In process of time different colonies of Greeks were introduced into Caria, and the original inhabitants were obliged to retire into the mountains, and to fortify themselves against the access of their enemies. At length the sterile soil of their mountainous retreat reduced them to a state of poverty, which roused their courage; and they constructed vessels and traversed the sea, and thus acquired a degree of power, which gave them the rank of a maritime empire. Eusebius refers this period to the interval that elapsed from the 11th to the 27th olympiad. Diodorus Siculus fixes the epocha of the maritime power of the Carians immediately after the taking of Troy, and pretends, that by means of their vessels they got possession of the isle of Lesbos. Herodotus says, that they very much contributed to the perfection of the military art by their ingenious inventions. The Carians, who were both a maritime and military people, assisted in establishing Psammetichus on the throne of Egypt, and he recompensed their services in a very liberal manner. Thus attached to the interest of his house, they succoured Aprius, the last of the descendants of this prince, when Egypt attempted to emancipate themselves from his power, and for some time resisted the attacks of all his enemies; but when Aprius fell, they were obliged to submit to the conqueror. Amasis, conceiving that they would afford him very considerable support, engaged them in his cause, by assigning to them a territory in the district of Memphis, the capital of his dominions. They evinced their attachment to Psammetichus, the son and successor of Amasis, when Cambyzes undertook the conquest of Egypt. Accordingly they joined his army; but when the Persians proved victorious, the surviving Carians retired into their own country, which had suffered much from its contests with the kings of Lydia. Alyattes was the first of all the successors of Gyges who formed the project of reducing the Carians to his dominion; but he probably did not succeed, as Herodotus reckons Caria in the number of the provinces annexed to the empire of Lydia by the arms of Croesus. After various struggles in defence of their country and their liberty, they were at last obliged to submit to the Persians, upon the reduction of Miletus. In the expedition of Xerxes against Greece, the Carians assisted him with 70 vessels, which were annexed to his naval armament. Lygdamis, to whom, according to Pausanias, the Lacedæmonians erected a statue, ascended the throne of Caria towards the 83d olympiad, and was succeeded by Hecatomnus, who made Mylasa the capital of his kingdom. He was allowed by the Persian court to possess the kingdom of Caria till his death, which happened in the 99th or 100th olympiad. His successors reigned 42 years. Artemisia, the second of that name, married Mausolus her brother, according to Arrian, who pretends that custom authorized such marriages in Caria. This prince reunited the whole of Caria under his dominion, and fixed his residence at Halicarnassus, which surpassed in magnificence all the cities of Caria. Mausolus made successful attacks on the Ionians, Lydians, and Lycians; and under his conduct the Carians got possession of the island of Rhodes. At the death of Mausolus, in the 4th year of the 106th olympiad, B.C. 353, the Rhodians threw off the yoke of the Carians; but Artemisia, the sister and widow of this prince, reduced them to their allegiance.

and also the inhabitants of the island of Cos, who had imitated their neighbours in their revolt. At the death of Artemisia, Idrieus assumed the reins of government, and when he died, the Carians conferred the crown on Ada, his sister and wife. Diodorus Siculus says, that the Persian court gave the investiture of the kingdom to a satrap; but Ada courageously resisted him, and at length, deprived of her dominions, she retired to the fortress of Alinda, which she maintained till the arrival of Alexander in Asia. When Alexander had gained the battle of the Granicus, he penetrated into Caria, and re-established Ada in possession of her kingdom. Arrian says that Ada adopted Alexander; but Plutarch suggests, that this conqueror adopted Ada, and always called her his mother.

CARIA, a town of Asia Minor, in a country of the same name. Ptolemy places it in Lycia. *Caria* was also an episcopal town of Asia, placed upon the Mæander.

CARIA, a name given by Arrian to a maritime country of Scythia, on the Euxine sea. It was an establishment of Carians, on this side of the Borysthenes, and at a distance from the Tanais.

CARIA, in *Entomology*, the name by which several travellers distinguish those mischievous insects that infest the East Indies, Africa, and other parts of the world, and which are known among modern naturalists by the name of *Termites*, and white ants. See *TERMES*.

CARIABAD, in *Geography*, a town of Hindoostan, in the subah of Oude; 40 miles N. of Lucknow.

CARIACO, a large gulf in the province of Comana, Terra Firma, South America. On the northern side at its mouth is Fort St. Yago, in N. lat. $10^{\circ} 7'$. W. long. $63^{\circ} 30'$; and on the southern side cape Bordones.

CARIACOU, the chief of the small isles dependent on the island of Grenada, in the West Indies; situate about 4 leagues from Isle Ronde, which is equally distant from the north end of Grenada. N. lat. $12^{\circ} 30'$. W. long. $61^{\circ} 22'$. It contains 6913 acres of land, and in general is fertile and well cultivated, producing in seasonable years a million of pounds of cotton for exportation, besides corn, yams, potatoes, and plantains sufficient for the maintenance of its negroes. The cultivation of sugar has been found less successful in this island than cotton, though it still continues to be made on two plantations. The number of inhabitants in 1779 was 5000; but they have since decreased. See *GRENADA*. Cariacou forms a 7th parish belonging to Grenada; and by an act passed in 1784, a stipend is provided for a clergyman in this parish. The parish town of this island is Hillsborough.

CARIACOU, in *Zoology*, a species of *Cervus*, which see.

CARIAMA, in *Ornithology*, the name of a Brazilian bird, described by Marcgrave in his History of Brasil: this is the crested screamer, *Palamedea cristata* of modern naturalists.

CARIANERS, or CARAYNERS, in *Geography*, a people of singular description that inhabit different parts of the Birman empire, particularly the western provinces of Dalla and Bassien, several societies of whom also dwell in the districts adjacent to Rangoon. None of them are to be found higher up than the city of Prome. They are a simple innocent race, speaking a language distinct from that of the Birmans, and entertaining rude notions of religion. They lead altogether a pastoral life, and are the most industrious subjects of the state: their villages form a select community, from which they exclude all other sects, and never reside in a city, nor intermingle, nor marry with strangers. They profess, and strictly observe, universal peace, not engaging in war, nor taking part in contests for dominion; and thus they

are placed in a state of subjection to the ruling powers, Agriculture, the care of cattle, and the rearing of poultry, are almost their only occupations. A great part of the provisions consumed in the country is raised by the Carianers, who particularly excel in gardening. The oppression which they have lately suffered has induced numbers of them to withdraw into the mountains of Arracan. They have traditional maxims of jurisprudence for their internal government, but they are without any written laws; custom, with them, constitutes the law. Some of them learn to speak the Birman tongue, and a few can read and write it imperfectly. They are timorous, honest, mild in their manners, and very hospitable to strangers. Symes's Embassy to Ava, vol. ii. p. 109.

CARIATA, in *Ancient Geography*, a town of Asia, in Bactriana, destroyed by Alexander.

CARIATI, NUOVA, in *Geography*, a town of Naples, in the province of Calabria Citra, situated on the S.W. coast of the gulf of Tarento; 25 miles N. of St. Severino. N. lat. $30^{\circ} 38'$. E. long. $16^{\circ} 6'$. At the distance of 2 miles S.W. of the former is *Cariati Vecchia*, in the same province, the see of a bishop, suffragan of St. Severino. It is farther from the sea, towards the river Canca. Cariati is a principality belonging to the family of Spinelli, one of the most opulent feudatory families, divided into several branches, and possessed of very capital fiefs in Calabria. The founder of this family was John Baptist Spinelli, who was very much distinguished by Ferdinand the Catholic, on his arrival at Naples, and enabled to purchase Cariati and other considerable estates, since augmented by the prudence of his descendants. The city is small, and thinly inhabited, on account of the weakness of its situation, and dread of the Turks, who, before a treaty was concluded with the Porte, were continually ravaging this coast. Its cathedral is a very heavy Gothic structure, dedicated to St. Peter, and the only parish. The surrounding hills are gay, and pleasingly covered with fruit-trees; the woods behind them produce manna of excellent quality; much Turkey wheat is cultivated in the lands below, and extensive pastures afford luxuriant and wholesome sustenance to a great stock of oxen, buffaloes, sheep, goats, and swine.

CARIATIDES, or CARIATES, in *Architecture*. See *CARYATIDES*.

CARIBALDI. See *GARIBALDI*.

CARIBBEAN SEA, in *Geography*, that part of the Atlantic ocean, which is bounded on the north by the islands of Jamaica, St. Domingo, Porto Rico, and the Virgin islands, on the east by the Caribbean islands, on the south by the country of Terra Firma, and on the west by the Musketto shore.

CARIBBEE ISLANDS, a range of islands extending in a kind of semicircular form, from Tobago in the south to Porto Rico in the north, and enclosing as it were between them and the main land the Caribbean Sea. They were discovered by Columbus in his second voyage, in November, 1493; and thus called by him from the name which the natives of Hispaniola gave to their ancient possessors. The term Caribbee or Charaibean is strictly applicable only to the *windward* islands, which were inhabited by the Caribbees or Charaibes; and the four large islands of Cuba, Jamaica, Hispaniola, and Porto Rico, are denominated *leeward* islands. But English mariners appropriate both terms to the Caribbee islands only, subdividing them according to their situation in the course of the trade wind; the windward islands terminating by their arrangement with Martinico, and the leeward commencing at Dominica, and extending to Porto Rico. The Caribbee islands are eminent-

ly fertile, and in a commercial view highly advantageous; their chief possessors are the English and French. Barbadoes, Antigua, St. Christopher's, St. Vincent, Dominica, Grenada, Montserrat, Nevis, and the Virgin isles are British; and the French possess Martinico, Guadaloupe, St. Lucia, Tobago, and some islets. To the Danes belong St. Croix, St. Thomas, and St. John, parts of the Virgin group; the Swedes hold St. Bartholomew; and the Dutch St. Eustatius. Of the whole group lying between the 58th and 66th degrees of W. longitude, and the 11th and 19th degrees of N. latitude, Barbadoes and Guadaloupe are the most important; and the latter, including Grand Terre, and Bassé Terre, is the most considerable in size. For a farther account of each island, see its appropriate article.

CARIBBEES, or CHARAIBES, the ancient possessors of most of the islands above mentioned. Columbus in his first voyage received information, that several of these islands were inhabited by a people of this name, who were fierce, savage, and predatory, the terror of the mild and inoffensive inhabitants of Hispaniola, and who delighted in the horrid banquet of human blood. In his second expedition, he found this information to be just, and was himself a witness of their intrepid valour. In their habitations, when he landed at Guadaloupe, he found reliëts of those feasts which they had made upon the bodies of their enemies taken in war; and at the same time, he released several of the natives of Porto Rico, who, having been brought captives from thence, were reserved as victims for the same horrid purpose. See CANNIBAL. The same character for valour and intrepidity has been invariably maintained by these people in all subsequent contests with the inhabitants of our continent; and even, in our own times, they have made a gallant stand in defence of the last territory which the rapacity of the Europeans had left in their possession. M. de Chanvalon, an intelligent and philosophical observer, who visited Martinico in 1751, and resided there six years, gives the following description of the Caribbees. "It is not the red colour of their complexion, it is not the singularity of their features, which constitutes the chief difference between them and us. It is their excessive simplicity; it is the limited degree of their faculties. Their reason is not more enlightened or more provident than the instinct of brutes. The reason of the most gross peasants, that of the negroes brought up in the parts of Africa most remote from intercourse with Europeans, is such that we discover appearances of intelligence, which, though imperfect, is capable of increase. But of this the understanding of Caribs seems to be hardly susceptible. If sound philosophy and religion did not afford us their light; if we were to decide according to the first impression which the view of that people makes upon the mind; we should be disposed to believe that they do not belong to the same species with us. Their stupid eyes are the true mirror of their souls; it appears to be without functions. Their indolence is extreme; they have never the least solicitude about the moment which is to succeed that which is present." Voyage à la Martinique, p. 44, 45, 51. M. de la Borde, Tertre, and Rochefort, confirm this description. Mr. Edwards (ubi infra) very properly observes, that M. Chanvalon seems to have formed his judgment of all the Charaibes from the few with whom he had any communication, and that he makes no allowance for their degradation in a state of captivity and servitude; though he admits this circumstance and strongly urges it in favour of the African blacks in the West Indies. The Caribbees evidently appear by the marked distinction of their character to be a separate race from the inhabitants of the larger islands. Their lan-

guage is totally different; and among themselves, they have a tradition, that their ancestors came originally from some part of the continent, and having conquered and exterminated the ancient inhabitants, took possession of their land, and of their women. Hence they call themselves "Bana-ree," which signifies a man come from beyond sea. Accordingly, the Caribbees still use two distinct languages, one peculiar to the men, and the other to the women; nor has the language of the men any thing common with that spoken in the large islands; whereas the dialect of the women considerably resembles it. The tradition derives from this circumstance considerable confirmation. The Caribbees themselves imagine, that they were a colony from the "Galibis," a powerful nation of Guiana, in South America. But as their fierce manners approach nearer to those of the people in the northern continent, than to those of the natives of South America; and as their language has some affinity to that spoken in Florida, their origin should be deduced rather from the former than the latter. In their wars, they still observe their ancient practice of destroying all the males, and preserving the women either for servitude or for breeding. Rochefort in his account of the Antilles, published in 1658, conjectures, that they sprung originally from Florida, and describes them as a colony of Apalachian Indians, who, being driven from the continent, arrived at the windward islands, and exterminating the ancient male inhabitants, took possession of their lands, and of their women. But being unable to subdue the inhabitants of the larger islands, these retained their distinctive manners and character. Mr. Edwards agrees in opinion with those, who trace their origin to a South American colony. To this purpose he says, that there anciently existed many numerous and powerful tribes of Charaibes on the southern peninsula, extending from the river Oronoko to Essequibe, and throughout the whole province of Surinam, even to Brasil, some of which still maintain their independence. With one of these tribes Sir Walter Raleigh formed an alliance, in his romantic expedition to Guiana in 1595; and he assures us, that the Charaibes of that part of the continent spoke the language of Dominica. Mr. Edwards, indeed, inclines to the opinion of Hornius, who assigns to these people an oriental ancestry, that migrated to the west across the Atlantic; and in confirmation of this opinion he alleges a similarity in the language of the Charaibes to the ancient oriental dialects, and also a striking resemblance in their customs and manners to those of the inhabitants of the east. The word "Charaibe," he says, in the Arabic language, signifies a robber or destroyer, an appellation frequently bestowed by the natives on the invaders of their country. As there were priests or prophets in Brasil under the appellation of Charaibes, they might have been called קרב אִישׁ, as men who offer קרבן, *corban*, an offering (see Lev. i. 2.); and κορυβαντ is the Greek for a priest of Cybele, or one of the Corybantes. But if the national name be derived from the warlike and predatory life of the Charaibes, we may derive it from חרב, signifying in Syr. and Arab. to *lay waste*. The noun denotes a sword or spear, and חרבה *Sam. war*.

Mr. Edwards has given us an highly interesting description of these savages; their national manners, habits, education, and such political and religious institutions as savages could fabricate; of all which we shall present our readers with the following concise epitome, referring to the author himself (ubi infra) for a more ample detail. Every trait in the character of a Charaibe marks him for a foreigner. The antipathy which this fierce race bears to the unoffending and more cultivated natives of the larger islands of Hispaniola,

paniola, Cuba, and Jamaica; his robust and muscular form, his towering, independent spirit, disdainful of restraint, and impatient under calamity; his dreadful seal on the human flesh of captives, whilst towards his own brethren he is faithful, kind, affectionate, and peaceable; and the incisions which he makes on his fearfied body, painted alternately with black and crimson, to render him terrific to his enemies in battle;—all conspire to proclaim him an *exotic*, transplanted either by design or accident from some distant clime, and bearing with him to his new abode the interminable impressions of his primitive *cast*. A Charaibe youth is educated amidst accumulated toils and sufferings. One of the earliest maxims inculcated on his tender mind was to bear exquisite pain without murmuring:—like the Spartan youth at the altar of Diana, he was scourged until agonizing nature was nearly exhausted; but no sigh was heard, no tear was seen to fall; for, if the severities which he sustained occasioned the least sign of weakness or sensibility, he was disgraced for ever. Public honours and national rewards crowned the fortitude that never shrunk from inflicted torture:—above all things, he was taught to cherish an inexorable hatred, and an insatiable thirst of revenge, against his natural enemy, the *Arrowauks* (which see), the inhabitants of Hispaniola, Cuba, and Jamaica. When more mature years called the Charaibe to the field, stripes, burning, and suffocation, constituted the test of him who was to lead the national troops to action. His heart thus hardened, and his nerves thus steelled, he beheld the unbounded carnage of his foes without the least remorse, nor checked his savage squadrons in the career of their sanguinary vengeance. Of their political maxims, one very prominent but disgusting feature is displayed in that abject vassalage in which the Charaibes keep their women. They are mere household drudges through life, and are denied even the privilege of eating in the presence of the tyrant husband. Mr. Edwards, on this subject, very justly observes, that the first visible proof that a people are emerging from savage manners is a display of tenderness towards the female sex. As the successful warrior was allowed to appropriate to himself as many of the captives as he thought fit, and his countrymen presented to his choice the most beautiful of their daughters in recompence of his valour; this last mentioned testimony of public esteem and gratitude probably gave rise to the institution of polygamy, which prevailed universally among the Charaibes, and still prevails among those of South America. This institution, says Mr. E., is the more excusable, as their women, from religious motives, carefully avoided the nuptial intercourse after pregnancy. Their females, on attaining the age of puberty, were distinguished by a sort of buskin, or half boot, made of cotton, which surrounded the small of each leg. In other respects both males and females appeared naked. Their hair, which was of a shining black colour, was dressed and adorned with peculiar attention; and the men, in particular, decorated their heads with feathers of various colours. On the death of a relation or friend, they cut it short like their slaves or captives, to whom the privilege of wearing long hair was rigorously denied. Like most other nations of the New Hemisphere, they nicely eradicated the incipient beard, and all superfluous hairs on their bodies. On the birth of a child, its head was confined between two small pieces of wood, placed one before and the other behind, which, being firmly bound together, elevated the forehead, and occasioned this and the back part of the skull to resemble two sides of a square. They resided in villages, which resembled an European encampment; and their cabins were built of poles fixed circularly in the ground, drawn to a point at the top,

and covered with leaves of the palm-tree. In the centre of the village was a building, larger than the rest, which served as a kind of hall, or state house, where their youth were animated to emulation, and trained to martial enterprise by the renown of their warriors, and the harangues of their orators.

Few arts and manufactures can be supposed to flourish among savages; yet the Caribbees ingeniously manufacture a substantial kind of cotton cloth, which they stain with various colours, and of which they make kamenoës, or hanging-beds; they also fabricate ornamental vessels of baked clay; they work very elegant baskets of the fibres of the palmetto-leaf; and their bows and arrows are finished with singular skill and neatness. Among the Caribbees of the continent, there was no division of land, every one cultivating in proportion to his exigencies. Their food, both vegetable and animal, except in the circumstance of their eating human flesh, seems to have been much the same with that of the natives of the larger islands. However, they held the flesh of some animals in abhorrence; such as that of the peccari, or Mexican hog, the manati or sea-cow, and the turtle. They scrupled also to eat the eel, abundantly supplied by several of their rivers. In some of these respects they manifest a conformity to the customs of the Jews. It is a singular circumstance, that on the birth of the first son, the father retired to his bed, and fasted with a strictness that often endangered life. A similar practice has been recorded concerning the Tybarenians of Asia, and the Iberians of Spain, and is still observed by the people of Japan. This ceremony of fasting was succeeded by rejoicing, drunkenness, and debauchery. They indulged extraordinary grief for their dead; they not only deplored their hair, but when the master of the family died, the surviving relations, after burying the corpse in the centre of his own dwelling, with many demonstrations of unaffected grief, quitted the house altogether, and erected another in a distant situation. It was their custom to place the dead in the grave in a sitting posture, with the knees elevated to the chin. As to their religious opinions and practices, we may observe, that they entertained the expectation of a future state, and pleased themselves with the fond conceit that their departed relatives were secret spectators of their conduct, sympathizing in their sufferings, and participating in their welfare. But regarding the soul as susceptible of the same impressions and obnoxious to the same passions, as when allied to the body, they deemed it a religious duty to their deceased heroes, to sacrifice at their funerals some of their captives which had been taken in battle. Immortality, without military glory, was considered by them as a curse; to the brave and virtuous, as to their wives and captives, they allotted a kind of Mahometan paradise; but to the degenerate and cowardly they assigned a state of punishment somewhere beyond the mountains, and an ignominy aggravated by captivity and servitude among the Arrowauks. The life of the Charaibe is not passed without acts of devotion paid to the universal Father. In every cottage is erected a rustic altar, composed of banana leaves and rushes, on which they offer to the Deity the earliest of their fruits, and the choicest of their provisions. His religion, in fact, however, is a religion of horror; in part, perhaps, the result of the tremendous irregularities of the climate. They mark an avenging deity, amid the madness of the hurricane, and amid the convulsions occasioned by frequent earthquakes. In the loud thunder of the tropic, the voice of the incensed deity is heard, while his arm in imagined vengeance launches the lightning which fires the standing fields of corn, and annihilates the promising harvest. Accordingly, beside the worship

worship which they paid to benevolent deities, they not only believed in the existence of demons and evil spirits, but offered to them also by the hands of their "Boyez," or pretended magicians, sacrifices and worship; wounding themselves, on such solemnities, with an instrument made of the teeth of the agouti, which inflicted horrible gashes; conceiving, perhaps, that the malignant powers delighted in groans and misery, and were to be appeased only by human blood. Robertson's America, vol. ii. Edwards's Hist. of the West Indies, vol. i.

CARIBEANA. See PARIA and New ANDALUSIA.

CARIBOU, an island towards the east end of Lake Superior, in North America, S.W. of Montreal bay. N. lat. 47°. W. long. 85° 30'.

CARIBOU, in Zoology, an American animal of the stag kind. See CERVUS caribou.

CARICA, in Botany, Linn. Gen. 1127. Schreb. 1536. Mart. Mil. (Papaya, Plum. p. 20. Tourn. Inst. p. 659. Juss. p. 399. Vent. vol. iii. p. 521. Gært. 707. Papayer, Encyc. Method.) Class and order, *diacia decandria*. Nat. ord. *Tricocca*, Linn. *Cucurbitaceæ*, Juss.

Gen. Ch. Male. *Cal.* very small, with five teeth. *Cor.* monopetalous, funnel-shaped; tube slender, long, gradually lessening downwards; border five-cleft; segments lanceolate-linear, obtuse, obliquely and spirally revolute. *Stam.* filaments ten, at the top of the tube of the corolla; five alternate ones shorter; anthers oblong. Female. *Cal.* perianth small, five-toothed, permanent. *Cor.* pentapetalous, Linn. Gært. five-cleft, Juss. Vent. Lam. petals or segments lanceolate-linear, very long, erect below the middle, reflected and twisted above. *Pist.* germ superior, egg-shaped; styles short; stigmas five, oblong, expanding; widened, truncate, and crenulate at the summit. *Peric.* berry large, five-furrowed, one-celled, fleshy. *Seeds* numerous, attached to five receptacles in the middle of the berry, oleaginous, egg-shaped, pointed, enclosed in a brittle, wrinkled tunic or aril.

Eff. Ch. Male. *Cal.* very small, five-toothed. *Cor.* five-cleft, funnel-shaped. *Filaments*, in the tube of the corolla, alternately shorter. Female. *Cal.* five-toothed. *Cor.* five-petalled, or deeply five-cleft. *Sigmas*, five. *Berry* one-celled, many-seeded.

Species, 1. *C. papaya*, Linn. Sp. Pl. (*C. vulgaris*, Encyc. Meth. Papaya carica, Gært. tab. 122. fig. 2. Lam. Illust. Pl. 821. Papaya-maram, Rheed. Mal. tab. 15. fig. 1. Ambapaya, tab. 15. fig. 2. Ababaye of the Caribs.) Common papaw tree. "Lobes of the leaves sinuated." Somewhat the habit of a palm. *Root* perpendicular, whitish, spongy, of a disagreeable taste and smell. *Stem* twenty feet high, a foot thick, naked almost to the top, marked almost its whole length with the scars of fallen leaves, of a tender substance like that of the banana, solid towards the base, hollow in its upper part. *Leaves* on petioles near two feet long, the lower ones almost horizontal, upper ones erect, deeply divided into seven, nine, or eleven sinuated and gashed lobes, alternate, near together. *Flowers* axillary, white, sweet-scented; males in slender, pendulous racemes, two or three feet long; pedicels short; females numerous, on short simple peduncles. *Fruit* about the size of a small melon; various in its form, sometimes angular, and flattened at both ends, sometimes oval or round, and sometimes pyramidal, yellow when ripe; containing a yellow succulent pulp of a sweetish taste and aromatic smell. It is seldom eaten raw, but, when boiled, is esteemed a wholesome sauce to any kind of fresh meat. It is also sometimes pickled in vinegar, and is frequently preserved in sugar, and sent to Europe with other tropical sweetmeats.

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When ripened in our stoves, it does not acquire its proper flavour, and is even said by Miller to be detestable. The whole plant abounds with a milky acrid juice. Male-flowers are occasionally found on the female plants, and female on the male ones. A native of both the East and West Indies. 2. *C. pasopasa*, Linn. Sp. Pl. Feuillée Pers. tab. 39. fig. 1. "Lobes of the leaves entire." *Stem* more frequently branched than that of the preceding. *Lobes* less divided, and often entire. A native of Surinam and Peru. 3. *C. spinosa*, Cmel. Syst. Nat. Encyc. Method. Aubl. Guian. ii. p. 908. tab. 346. "Leaves digitate; leaflets quite entire; stem with harmless spines." *Trunk* branched: less than a third of its height. *Leaflets* seven, smooth, pointed, green above, whitish underneath. *Berry* yellow, egg-shaped, smooth, marked with several longitudinal furrows; flesh yellow, succulent. A native of Guiana and Brazil.

The first species only has been cultivated in Europe. It is easily propagated by seeds brought from its native climate, which should be sown in a hot bed early in the spring. When the plants are near two inches high, they should be transplanted separately into small pots filled with a light, gentle, loamy soil, and plunged into a hot-bed of tanner's bark. As they advance in growth they will require larger pots and when they are too tall to remain under frames, they must be placed in the tan-bed of the stove, where they will grow to the height of near twenty feet in three years, and produce flowers and fruit. In every period of their growth they should be sparingly watered. Mart. Mil.

N. B. The annona triloba, trifid fruited custard-apple, is also called the papaw-tree in the southern states of North America.

CARICA, among Ancient Naturalists, denotes a kind of fig peculiar to Syria; sometimes also the dried fig. It is also used in ancient writers to denote the fruit of the palm tree, otherwise called *cariata*, which was sent annually by clients, on New Year's day, as a present or acknowledgment to their patrons.

CARICA, in Zoology, a species of *Murex*, which see.

CARICATO, Ital. loaded; a term in Music, usually applied to the base finger in an Italian burletta, as *Buffo caricato*; to a song of which the accompaniments are too full; or to any thing crowded or overcharged. See CHARGÉ.

CARICATURA, in Painting, a loading, or exaggeration of the defects of an object represented, with a concealment of the beauties or advantages of it; yet so as still to preserve a resemblance.

The word is Italian, formed of *carica*, a load, burden, or the like.

CARICOUS Tumour, in Surgery, is a fig-like excrescence, (usually named *ficus* by the moderns,) situated near the anus or pudendum, and frequently arising from illicit amours. See FICUS.

The etymology of the term *caricous* has been sometimes mistaken. It is derived from *carica*, a dried fig, and does not mean the same as *καρκινoidες*; although the editors of a new medical and physical dictionary, copying the error of Quincy, say that "the caricous tumour is called by Hippocrates *καρκινoidες*;" whereas, this latter word (according to Galen, Suidas, Erotian, Hesychius, Philocrates, and others), denotes a kind of luxurious *ragout*, composed of blood and various condiments, invented by the Lydians, and which Varinus supposes obtained the name of *καρκιν*, because it was of a blackish colour, resembling boiled walnuts. Vide Gorrhæi Def. Medic. Lexic. Schrevelii, and Econ. Hippoc. Fœsli.

CARICUM, a cathartic application for cleansing for-

did ulcers and eroding fungous flesh. See Hippocrates de Ulceribus; and *αριον*, in Galen's Exegesis. It is prepared of black hellebore, sandarach, *squama aris*, washed lead, sulphur, orpiment, and cantharides; these being mixed, are made up with oil of cedar into a liquid medicine. Sometimes there is added arum, in decoction or juice, or the powder of it mixed with honey. The dry medicine or powder, for the same purpose, is prepared of the same ingredients, omitting the oil of cedar, and the honey: it is also made of black hellebore and sandarach only.

CARICUS, in *Ancient Geography*, a river of the Peloponnese, in Laconia.

CARIDES, or CARIDA, a town of Asia Minor in Phrygia. Steph. Byz.

CARIDIEN, in *Geography*, an island of Asia, in the Indian sea, near the west coast of the island of Ceylon; 12 miles long and two wide. N. lat. $8^{\circ} 30'$. E. long. $79^{\circ} 55'$.

CARIEBOEF mountains, a ridge of mountains in the western part of North America. N. lat. $53^{\circ} 45'$. W. long. 115° .

CARIES, in *Surgery*, is a term which implies a corruption or putridity of some part of the animal body: this word was used by the older surgeons, and especially by those of the middle age, to denote a foul or corroding ulcer of the genitals, arising from impure coition; but we now almost exclusively apply it to a dissolution of the bony structure, either in an actually dead state, or tending to death. The most general distinction of *caries*, is into the *dry* and the *moist*.

The former species may best be compared with a dry GANGRENE of the soft parts. The bone is white, dry, and dead, but otherwise smooth and even; no appearance of putrefaction, matter, or exulceration is visible; only it is observed, that the bone is incapable of adhering to the surrounding soft parts, or when separated from them, of again forming an adhesion with them. In the majority of cases, this caries begins at the surface; much more rarely in the internal substance, of the bone. Sometimes it changes into the humid caries.

The *humid caries* is, with respect to a bone, the same as an ulcer with regard to the soft parts. In this disease the bone is yellow, brown, or black, corroded, uneven, partly consumed, and a fetid matter issues from it. It is distinguishable into the *occult*, and the *open caries*.

In the first, the bone is still covered with soft parts, and the external integuments are either entire, or there exists already an ulceration, which nevertheless does not lay the bone bare. In the first case the integuments over the diseased part of the bone are wasted, relaxed, oedematous, red or livid; without, however, being inflamed. The patient constantly feels gnawing, lancinating pains in the bone below the part, which are increased by external pressure; and when the disease of the bone is of any considerable extent, the patient is generally affected also with a slow hectic fever.

In the second case, the ulcer in the soft parts is generally very obdurate and of a foul appearance, without any manifest cause; it discharges a great quantity of very ill-conditioned matter, and it is relaxed and surrounded with fungous excrescences. All endeavours to heal it prove ineffectual, or if it does skin over, it soon breaks out again; and frequently, when the cause of this obstinacy is not discovered, these ulcers are conceived to be of a malignant and cancerous kind.

The open humid caries may be known by the more or less copious discharge, which has an intolerable and peculiar fetor, staining linen with black spots, and discolouring the

silver probes that are introduced into it, and in which generally small black particles are seen to float. The ulcer in the soft parts is relaxed, uninfamed, spongy, and much inclined to bleed, and the bone is entirely bare, soft, uneven, corroded, brown or blackish. Sometimes a great quantity of fungous flesh grows out of the bone itself, which easily bleeds, covers the bone, and thus renders both the diagnosis and the cure of the disease more difficult. This species of caries may be compared with fungous ulcers of the soft parts. In another species of caries, the bone seems to be gradually converted into muscular substance.

The humid caries begins either in the inner part of the bone or at its surface. In the former case, the patient first experiences for a long time violent pains in the bone, which are not increased by external pressure; after which, the bone becomes swelled, the disease makes its way through the bone, attacks the soft parts, and terminates in an open caries. This species of caries, which begins in the interior substance of the bone is far more dangerous than that which commences on its external surface; in other respects there is no material difference between the two species; for the internal caries is frequently produced by external causes, and the external caries may sometimes proceed from internal causes. Caries is sometimes combined with an enlargement of the bone, and that most frequently when the caries begins in the centre of the bone; however it occurs also not unfrequently in the caries which begins externally. This swelling, nevertheless, does not alter the character and manner of treating the caries; it may occur as well in a mild as in a malignant caries, and sometimes after the original disease has been cured, the swelling may remain during the life of the patient.

Besides these, several other subdivisions of the caries may be enumerated; such as,

1. The *gangrenous caries*, which is a variety of the dry caries. The colour of the bone is not much changed at first, but when the exfoliation begins, it becomes greyish, afterwards brown, and finally black. The exfoliation takes place more easily than in the other species of caries, after the manner of a perceptible exfoliation. The same also happens here which is observed in the separation of gangrenous substance in the soft parts. (See the Art. GANGRENE.)

2. Another variety of the humid caries is the *worm-eaten caries* of Petit, which may be compared with an ulcer of the soft parts, having many cavities, and when the discharge proceeds from corrupted marrow; or with an abscess, the matter of which oozes out through a number of small orifices in the skin. The bone becomes spongy, and full of holes, but it is not very black. The discharge is copious, and generally it blackens silver probes. Portions of the bone separate themselves; however, no regular exfoliation takes place, unless this species of caries is changed by art into the above-mentioned gangrenous caries. The bone is gradually destroyed and consumed by the suppuration, and it becomes so brittle that it can hardly be touched without breaking.

3. The *fungous caries* is in all respects similar to the preceding, except that spongy flesh, which readily bleeds, grows out of the carious bone.

4. The *phagedænic caries*. In this disease, the periosteum is thickened, the bone becomes soft, and from its carious surface a fungous substance, of a red or yellow colour, sprouts forth. When the disease spreads deeper, it gradually destroys all the osseous fibres. This species is distinguished from the fungous caries mentioned above by the circumstance, that in the latter the spongy flesh proceeds from the holes of the bone, the edges of which, though discoloured, still remain hard and osseous: whereas, in the phagedænic caries,

the osseous fibres disappear wherever the fungous flesh sprouts out; so that, were we to depend entirely on the probe, it would be very difficult to determine whether the bone were carious or not. For when we rub it under the spongy flesh, with the end of the probe, its surface, though uneven, does not seem to be very rough, neither can any considerable discoloration be perceived in it.

5. The *scrofulous caries* is discovered on opening a scrofulous abscess, when frequently the bone beneath, though of the natural colour and smooth, is found to be detached from all connection with the soft parts. Being now exposed to the air, it gradually becomes discoloured, which circumstance, as well as that it no where adheres to the subjacent parts, sufficiently evinces that the circulation in it is interrupted. Another species of scrofulous caries is that which occurs in white swellings of the joints. (See WHITE SWELLING.)

6. The *cancerous caries* commences with an enlargement of the bone; which in some parts is soft, and its internal substance neither fibrous nor cellular, but seemingly composed of an irregular accumulation of osseous matter. It is covered with a tendinous or cartilaginous substance, from which a smooth fungous excrescence grows out, and exudes a limpid, acrid and fetid ichor. The patient complains much of deep-seated, pulsating, and very acute pain; and the ulcer bleeds profusely in consequence of the gradual corrosion of the vessels at its surface. This species of caries may be compared with a cancer of the soft parts, to which it also is frequently superadded, when the cancer has spread itself as deep as the bone. (See CANCER.)

As a species of caries, may also be mentioned that gradual wearing away and consumption of the bones, which takes place when they are exposed to constant pressure; as for example, in aneurisms, hydrocephalus internus, &c.

The NECROSIS is, indeed, generally considered as a disease of the bones distinct from caries; however, it may not improperly be looked upon as a species of the dry caries, with a total privation of the living principle.

In all cases in which an ulceration of a bone discharges a large quantity of matter, the surgeon must not rest till he has discovered and sufficiently opened the source from whence the discharge proceeds. The humid caries spreads itself constantly farther and farther; and that the more rapidly, and in a more violent degree, the looser the bone is, and the more the discharge of matter is obstructed by any cause. Moreover, the consequences of the humid caries are as various, and of the like nature, as those of ulcers; for not only the functions of the diseased part, but also those of the neighbouring organs, are always more or less affected; the patient is weakened by the daily loss of fluids; his blood is vitiated by the absorption of the matter, and a hectic fever is produced, with a constant state of crethism.

The most frequent causes of the dry caries are external injuries, whereby a bone is laid bare; and in consequence of a deficiency of nutritious fluid, the access of the external air, or the contact of vitiated juices, it loses the living principle and dries up. In such cases it retains its vital powers longer in young subjects than in old. Sometimes this species of caries takes place spontaneously; probably when any pernicious acrimony, especially of the arthritic or venereal kind, is deposited upon the periosteum.

The humid caries is produced by causes similar to those of ulcers in muscular parts; and may even be produced by such ulcers, when they penetrate as far as the bone. This caries may therefore be divided into as many species, as there are reckoned of ulcers, with respect to their causes; and

of local causes the most frequent are the denudation, contusion, and violent concussion of the bone.

The danger in caries depends, as in ulcers, upon the absorption of unhealthy matter, the daily loss of fluids, and the consequent hectic fever; but in caries, the absorption of matter takes place to a much greater degree, and is more pernicious, as the disease is deeper seated, and the matter extremely acrid and corrupted.

The prognosis depends upon the situation or condition of the bones, the extent of the caries, its cause, and its duration. (See ULCER.)

The dry caries requires for its cure that the dead substance be separated from the living; and this is done either by a perceptible or imperceptible exfoliation, which is effected either by a surgical operation or the efforts of nature. When the surgeon foresees that an exfoliation is about to take place, he must open the ulcer in the flesh sufficiently, and keep it open, in order that he may be able to extract the separated portions of bone. But in an imperceptible exfoliation this is not necessary. A perceptible exfoliation generally takes place when the dead portion of bone is strong and thick; but a thin layer of dead bone commonly exfoliates imperceptibly, as do loose and spongy bones: hard and firm bones commonly exfoliate perceptibly. In young subjects the bone is more readily comminuted, and the imperceptible exfoliation is much more frequently observed, than in old ones. (See EXFOLIATION.)

In the perceptible exfoliation, the dead portion of bone first becomes whitish and dry; after some time it seems gradually to raise itself, and yields a sort of hollow sound, when struck upon with a probe; at length a fissure is formed in the circumference of the dead part, which separates the dead from the living portion of the bone. This fissure gradually becomes wider, and at the same time the piece of bone becomes more and more elevated; new flesh is found between the living and dead bone, which as it rises separates the dead portion, until at length it grows loose, and finally falls off. The bone beneath is then found covered with granulations which in some degree supply the place of the lost portion of the bone, and in time become ossified.

The exfoliation is entirely a work of nature, but the surgeon must promote it. He must first endeavour to remove the internal cause of the caries; then (if the exfoliation be judged inevitable), destroy completely the life of the diseased portion of bone, and promote its separation. The internal causes of caries are to be removed in the same manner as those of ulcers. Externally may be applied strong brandy, and various tinctures prepared with it. The diseased portion of the bone is to be kept constantly wet with pieces of lint dipped in spirituous liquids. But when the diseased portion of bone is so thick and strong that it cannot be penetrated by these fluid applications, another mode of treatment is necessary. There are three different methods according to which we may proceed; but, of these, that which is most adapted to the peculiar circumstances of the case must be chosen.

We may either burn the bone by applying a red-hot iron, or we may bore a number of holes, the more the better, (by means of a perforator or small trephine), but so as never to pierce the sound portion; in order that the above-mentioned remedies may be able to penetrate into and entirely dry out the bone; or we may remove, by means of a scraper, so much of the bone, that the remaining layer may easily be penetrated by drying remedies. It is however well to be attended to, that when the life of the bone is entirely destroyed, the drying remedies should no longer be employed.

as they then will answer no purpose, and at the commencement of the exfoliation will even be hurtful. Moreover these remedies should come into contact with the whole circumference of the diseased portion of the bone, but (if possible) not with any of the sound part.

The first of these objects must be attained by laying bare the whole diseased portion of the bone by means of incisions; and the second, by not laying the bone bare further than it is diseased, or by covering the denuded sound portion with lint spread with some emollient ointment, also by not inbuing the lint with so large a quantity of the drying remedies as will come into contact with the sound parts, and by not using these remedies longer than is necessary. It is also particularly requisite, when a red-hot iron is to be applied, that the carious part should previously be well dried out, in order that the heated fluid may not come into contact with and destroy the sound portion of the bone.

As soon as the life of the diseased portion of the bone is completely destroyed, the surgeon usually employs such remedies as promote the exfoliation, suppuration, and growth of the new flesh; such, for example, as the bals. Arcæi, either alone, or mixed with a little oil of turpentine, the ungu. althææ, or resinæ flavæ, &c. These remedies are applied warm; but in order that they may be able to penetrate to the living part of the bone, holes are bored into different parts of the diseased portion with the perforator; and the more numerous and large these perforations are the better. Every hole, however, ought to penetrate as far as the living part, and we are directed by many surgeons to continue boring till some blood appears. As soon as this has been done, the bone must be covered with warm emollient applications. Should the exfoliation not take place under this treatment, we may conclude either that the diseased portion of the bone is not entirely deprived of its life, in which case the application of the drying remedies must be repeated, or the cure is impeded by some internal cause, which must be discovered and removed. When the diseased bone begins to grow loose, it will be proper to shake it gently from time to time, without exciting, however, either pain or bleeding, in order to accelerate its separation; and when the exfoliation has been completed, the ulcer is to be treated like a simple, clean abscess.

A much more speedy and perfect cure, however, may be effected when the surgeon performs the separation himself. This is particularly necessary when the diseased portion of bone is very thick; but it is only admissible, when we have a free and unobstructed access to the whole circumference of the diseased bone. According to the difference of the situation and form of the bone, the separation of it is performed in different ways. When only a thin layer of bone is diseased, it may be scraped off with the scraper, or with the exfoliative trepan, or still more conveniently with a piece of glass. A thick layer of bone is to be separated with the chisel and hammer; and that this may be done without using great force, or producing a violent concussion, the bone must be previously bored through with the perforator; we must also only attempt to chisel off small pieces at a time; and that the whole of the diseased portion has been removed, we may know by the whole surface of the bone becoming red and bloody. When the bone is flat, and diseased through and through, we may apply the trepan, and in cylindrical bones we may sometimes saw off the diseased portion. A bone that is diseased throughout must be extracted. As soon as the whole of the diseased portion has been separated the remaining part is to be treated like a simple wound, and the bone is to be dressed with emollient warm applications, under the use of which it generally becomes covered with flesh in a

short time. In order that it may not again become diseased it must be carefully defended against the cold, air, and spirituous substances. In many cases the surgeon cannot remove the whole of the diseased portion of the bone, and in this case he must combine the two methods of cure with each other; that is, he must remove the greater part of the diseased bone, entirely destroy the life of that which is left behind, by the application of the remedies formerly mentioned, then perforate according to Beloste's method, and dress the part with emollient applications.

The method of cure in the humid caries is nearly the same as that used in the dry; only in the former it is necessary that the discharge should be diminished, its condition improved, and at length that it should be dried up; since, till that has been done, no exfoliation can take place. If it proceeds from an internal cause, this must, if possible, be removed. Thus a cure is frequently obtained; however not always, for often the caries remains in consequence of local causes, in which case it must be treated as a local disease. In this case the surgeon must promote the evacuation of the matter by every means in his power; he must lay the bone sufficiently bare by means of incisions; the limb must be kept in a dependent position; and the ulcer covered with light dressings, in order that the thinner part of the discharge may run through; and in general every thing which might occasion a stagnation and accumulation of the matter in the ulcer must be most carefully avoided. But when the bone swells, and a quantity of matter is discharged from the ulcer, disproportionate to its apparent magnitude, so that we have reason to conclude the matter stagnates in the fungous substance, or hollow of the bones, and there carries on its ravages in secret, the bone must be laid open in time by means of the trepan or perforator. Moreover, in all cases of humid caries, it is very useful to dress the ulcer with sponge or dry lint.

When the caries penetrates deep into the bone, we may apply spirituous tinctures and fomentations externally; but in using these remedies, the directions which we have formerly given are to be observed.

Of the internal remedies which contribute to improve the condition of the discharge, asa fœtida has been recommended in the form of pills as one of the most efficacious; as it generally deprives the matter in a few days of all its fetor and acrimony, and thus sometimes is alone sufficient to produce the exfoliation and cure. In obstinate cases of caries, good effects have been produced by the use of lime-water, hemlock, oak-bark, cinchona, and opium taken freely; but we are, nevertheless, too often disappointed in our expectations from medicine, and no one plan will be efficient in all such cases. And, whatever plan may be adopted, it will be at the same time particularly necessary to breathe a pure air, and use an appropriate diet.

When the cause of the caries has been removed, and the condition of the discharge improved, the exfoliation and cure are sometimes promoted by the judicious application of a bandage to the part.

Should the means that have already been mentioned be found inadequate to produce the desired effect, the surgeon is obliged to have recourse to more powerful ones; in order thereby to convert, as it were, the humid caries into the dry, and to accelerate the exfoliation and cure; for this purpose a red-hot iron is often our only resource. As an excellent remedy against caries, Mr. Lentin recommends phosphoric acid, prepared according to Gren's method. One part of this to be mixed with seven parts of distilled water, and applied to the bone itself, or used as an injection. Internally, the pure phosphoric acid has been administered, in doses of 10, 15, to 20 drops, thrice a day, in water, or a linctus. Sometimes

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Sometimes Mr. Lentin added a little myrrh to it, for external application; or mixed the phosphoric acid with an infusion of sabine, scordium, or cort. falcis.

When the diseased bone is covered with much fungous flesh, this must first be removed by means of caustic applications, in order that it may not obstruct the operation of the red-hot iron on the bone. When the caries penetrates so deep into the bone that the operation of the cautery does not extend quite through it as far as the bone, a part of the diseased portion may be removed with the scraper, or the chisel and hammer. In flat bones, under which important parts are situated, as, for example, the cranium, the application of the red hot iron must either be omitted or performed with great caution. When any of these means have been applied to a sufficient extent, the surgeon must treat the disorder as a dry caries. If exfoliation does not commence within the space of about 25 days, the remedies must be renewed. When exfoliation has completely taken place, and the bone situated below the separated portion becomes covered with sound flesh, the cure is completed; but if it remains bare, or is covered with fungous flesh, it is still diseased, and must be touched either with Belotte's liquor, or the actual cautery.

When the caries is of great extent, and penetrates deep into the bone, the best method will be to remove the diseased portion of the bone, either entirely or in part, by means of chirological instruments; and the manner in which this may most conveniently be done, will depend upon the circumstances of each particular case. If the caries be entirely confined to the surface of the bone, the damaged portion may be removed with the scraper, or the exfoliating trepan, or a piece of glass. The chisel and hammer are required when it penetrates deep into the bone; the trepan may be used when it penetrates into the medullary cavity, or the cellular substance of the bone. If the whole bone be diseased throughout, the external teguments must be laid open, and the bone extracted. In other particulars the surgeon has to proceed in the manner above directed.

Caries sometimes renders it necessary that the limb should be amputated; namely, when a bone of one of the extremities is either entirely, or particularly at the joint, carious through and through; and especially when the muscular and more important parts are in a great measure affected by the disease of the bone, and either corroded or destroyed, as may happen in what is named the *CANCEROUS* caries. It has, however, been observed, that, after this operation has been performed, the disorder often breaks out in some other part, and renders all medical assistance ineffectual. If, on the contrary, the muscular parts have suffered but little, although the bone is very carious, amputation ought not to be performed; but all that the surgeon can and ought to do, will be to lay bare the whole of the diseased bone by incisions, and to separate it from the soft parts with the scalpel, and from the sound portion of the bone with the saw. In these cases, nature sometimes supplies the portion of the bone that has been lost, and though this should not happen, the operation above mentioned is still preferable to amputation in this particular case.

Neither is amputation always admissible when the caries proceeds from some internal cause, and this has not been removed. It must also be avoided when the patient is already greatly exhausted by the disease: however, the surgeon need not be deterred by the mere presence of hectic fever; as this arises principally from the irritation or absorption of matter, and disappears, together with its cause, after the operation has been performed. It also happens, not unfrequently, in cases of old caries, in which the constitution has become accustomed to the discharge, that troublesome symptoms super-

vene upon amputation, which perhaps may be prevented by means of issues.

When the carious bone is covered with a great deal of fungous flesh, desiccative remedies and pressure must be applied; and should these not prove sufficient to extirpate it, we must use a caustic, or the actual CAUTERY. In these cases there is generally also some internal cause present, which we must endeavour to remove by means of appropriate internal remedies. In that species of caries in which the bone is converted into a kind of fleshy substance, the internal and external use of lime-water has been found beneficial; the surgeon must, however, always attend at the same time to the internal cause. See *OSTEOSARCOSIS*.

Concerning that species of caries which begins in the internal substance of the bone, see *SPINA Ventosa* and *NECROSIS*; and for the venereal caries, see *SYPHILIS*. Likewise, concerning carious teeth, we refer to the article *TEETH*. See also *Distortion of the SPINE*.

Although we have here laid down the rules of practice, which the generality of surgeons follow in the treatment of caries, it must still be acknowledged that no subject in the whole compass of the art is more liable to obscurity and debate. The modes of treatment adopted by one surgeon, will be often regarded as either useless or pernicious by another; so that while we are obliged to describe certain plans of chirological management, it is with a full conviction that no one method will be universally approved. The following remarks of M. Boyer, of Paris, are submitted to our readers, as deserving their attention, and as being among the latest with which the public have been favoured by any systematic writer.

"There is perhaps," says he, "no disease in which the indications of cure are more vague than in caries, and none in which the treatment is less regular. The ancients prescribed unctuous or relaxing applications, but they preferred acrid irritating substances, such as the powder of euphorbium, tincture of aloes and myrrh, oil of turpentine, mineral acids, caustic alkali, or even the actual cautery. Monro, Tenon, and, in imitation of them, some modern practitioners, have preferred the use of unctuous and emollient applications; but, in order to discover the preferable mode of treatment, it is necessary to take a close view of the evil against which it is to be directed. We must then consider, that a bone affected with caries is a prey to a morbid action of its own parts, and that this action creeps from one part to another, and pervades the whole with greater or less rapidity, if art does not come to the assistance of nature to arrest its progress.

"If the caries be produced by some affection of the system, this should be ascertained and combated with appropriate remedies. Thus the use of mercurial and sudorific medicines arrests the progress of caries proceeding from the venereal disease, and aids nature in separating the unsound from the sound part. The use of spirituous drinks, vegetable diet, and acids, removes at once scurvy and the caries, to which it had given rise, &c. &c. But if it has been occasioned by an external cause, or if it has remained after the internal one has been removed, so as to be reduced to the state of a mere topical affection, its progress may be arrested, and the separation of the diseased parts facilitated by the use of such substances as stimulate the parts, or such as absorb and neutralize the fluids which tend to propagate the morbid action. Thus the desiccation of a carious ulcer has been effected by the use of an absorbing powder and pledgets of lint that had been dipped in tincture of aloes and myrrh.

"If these remedies be found ineffectual, recourse must be had to more active ones: a pledget of lint dipped in a solution of nitrate of silver, may be applied on the carious part; and

and renewed every day. This portion of the bone is by this means quickly dried up, and reduced to the state of a simple necrosis; the propagation of the morbid action is arrested, and nature effects a separation of the diseased parts. It will not be amiss, however, to move frequently the dried piece, and it may be necessary to prevent the fungous flesh from spreading so as to impede the exfoliation. The ulcer heals after the exfoliation has taken place, and the cicatrix is more or less deep, and of a red colour, not blackish and livid, as a cicatrix formed over a diseased bone.

"If the caries be very humid, that is, if a great quantity of sanies flow from it, these remedies, even the mercurial nitrate, will be of no effect. The sanies washes the pledget, and dilutes the caustic so much, that its action is considerably enfeebled. Caustic potash would be subject to the same inconvenience. In these cases, the actual cautery is a remedy to be preferred to all others: by its action the carious part is in an instant reduced to the state of an inorganic dry substance, and the caries thus converted into necrosis. This remedy is applicable to every case of humid caries where the surrounding soft parts have not a manifest tendency to cancer. Sometimes, however, the soft parts surrounding a carious bone have that tendency in so advanced a degree, that the actual cautery would necessarily occasion the development of that morbid state. The general rules to which the use of the actual cautery may be reduced are as follow:

"In the first place, all the carious part of the bone must be laid bare, whether by cutting away the soft parts, or destroying them by caustic. The latter method being tedious, inconvenient, and uncertain, should not be used unless when the patient will not submit to the use of the knife. The bone being in this manner laid bare and scraped, the surgeon provides himself with several cauterizing irons of the same form, because the application of one is seldom sufficient. It will also be necessary to provide a number of canulæ when the cautery is to be applied on a bone from about which the soft parts cannot be completely raised, as, for instance, on the os coccygis, or sacrum: by means of these canulæ, the hot iron can be introduced without injuring the soft parts. In every case it will be necessary to protect the surrounding parts as much as possible from the action of the cautery.

"The iron, whatever may be its size, should be heated white, as the hotter it is the more rapid and less painful is its action. On the instant of its application, a black thick smoke rises from the surface of the burning bone, the smell of which resembles exactly that of burning horn: the great quantity of sanies quickly diminishes the heat; for which reason a second is to be immediately applied with the same precautions; and a third, if the two preceding have not burned deep enough. Care should be taken to extirpate the disease by burning every part that is affected; and if the use of the cautery has not always had the success expected from it, the failure of it is to be attributed to the timidity of the operator. A carious bone becomes worse by the application of the actual cautery, if the evil be not entirely rooted out; just as a cancerous tumour becomes irritated, and makes a more rapid progress, if imperfectly cauterized.

"The actual cautery acts by evaporating the noxious fluids in which the carious bone was immersed; by changing the caries into necrosis, and by irritating the subjacent sound parts, and exciting that action of the vessels by which the dead part of the bone must be thrown off.

"It is almost superfluous to remark here, that this operation cannot be undertaken with any hope of success, if the internal cause of the caries still exist." Boyer's Diseases of the Bones, vol. i. p. 334, & seq. edit. Lond. 1804.

CARIGE, in *Ancient Geography*, a town of India, on this side of the Ganges. Ptolemy.

CARIGNAN, in *Geography*, a town of France, in the department of the Ardennes, and chief place of a canton, in the district of Sedan, formerly a provostship, called "Ivoy," belonging to the dukes of Luxemburg, the dukes of Burgundy, and the house of Austria, but at length ceded to Louis XIV., who changed the name, and erected it into a duchy; three leagues E.S.E. of Sedan. The place contains 1500, and the canton 10,923 inhabitants: the territory comprehends 225 kilometres and 27 communes.

CARIGNANO, a town of Piedmont, in the district of Savigliano, and capital of a principality, to which it gives name, seated on the Po, over which it has a handsome bridge. It gives the title of princes to a collateral branch of the house of Savoy. This town was plundered and burned by the French in 1536, and in 1544, the fortifications, except the citadel, were razed, and most of the churches destroyed. It is about 10 miles S. of Turin. N. lat. 44° 30'. E. long. 7° 25'.

CARIGNANO, a town of the island of Sardinia; 15 miles W.N.W. of Terra Nuova.

CARIGUE, an island in the river Shannon, on the coast of the county of Kerry, Ireland, opposite to Scattery Island. Near it are the ruins of Carrigfoil castle, once a place of great strength, the lands belonging to which were granted to Trinity College, Dublin.

CARIGUEIA, in *Zoology*. See *DIDELPHIS Opossum*.

CARIGUEIBEIU. See *MUSTELA brasiliensis*.

CARILLÆ, in *Ancient Geography*, a town of Italy, mentioned by Silius Italicus, and supposed to belong to the Picentini, who inhabited the district now called Principato Citra.

CARILLONS, a species of chimes frequent in the Low Countries, particularly at Ghent and Antwerp, and played on a number of bells in a belfrey, forming a complete series or scales, of tones and semitones, like those on the harpsichord and organ. There are pedals communicating with the great bells, upon which the *carillonneur* with his feet plays the base to sprightly airs, performed with the two hands upon the upper species of keys. These keys are projecting sticks, wide enough asunder to be struck with violence and velocity by either of the hands edgeways, without the danger of hitting the neighbouring key. The player is provided with a thick leather covering for the little finger of each hand, to guard against the violence of the stroke. These carillons are heard through a large town.

Carillon is likewise the name of a small keyed instrument to imitate a peal of hand bells. The tones are produced by box hammers striking iron bars of different lengths. Handel used to accompany his air in Milton's Allegro, "Or let the merry bells ring round," on this instrument. And in Saul, the chorus "Welcome, welcome, mighty king."

CARILLONEUR, the musician who plays the carillons, or chimes with hands and feet; an office of extreme labour, peculiar to Holland and the Netherlands.

CARILLONEUR of Buffon, in *Ornithology*, the chiming thrush, *Turdus tintinnabulatus*.

CARILOCUS, in *Ancient Geography*, now Charlieu, a town of Gaul, belonging to the Ædui. Ptolemy.

CARIM-CURINI, in *Botany*, Rheed. Mal. See *JUSTICIA echolium*.

CARIMGOLA, Rheed. Mal. See *PONTEDERIA vaginalis*.

CARIMON, in *Geography*, one of the chief towns in the kingdom of Yohor, which occupies the southern extremity of the Chersonese, in the peninsula of Malaya, or Malacca.

CARIMON

CARIMON *Java*, a cluster of islands in the Indian Sea. S. lat. $5^{\circ}48'$. E. long. $109^{\circ}15'$.

CARIMPANA, in *Botany*, Rheed. Mal. See BORAS-
cus flabelliformis.

CARIM-TUMBA, Rheed. Mal. See NEPETA *malabarica*.

CARINA, a Latin term, properly signifying the keel of a ship, or that long piece of timber running along the bottom of a ship, from head to stern; upon which the whole structure is built, or framed.

CARINA is also frequently used for the whole capacity or bulk of a ship; containing the hull, or all the space below the deck. Hence the word is also sometimes used, by a figure, for the whole ship.

CARINA is also used in the ancient *Architecture*. The Romans gave the name carina to all buildings in the form of a ship, as we still give the name nave to the middle or principal vault of our Gothic churches, because it has that figure.

CARINA, among *Anatomists*, is used to denote the *spina dorsa*. As likewise for the fibrous rudiments, or embryo of a chick, appearing in an incubated egg. The carina consists of the entire *vertebrae*, as they appear after ten or twelve days incubation. It is thus called, because crooked, in form of the keel of a ship.

CARINA, in *Botany*, Eng. keel. A name given to the lowest petal of a papilionaceous flower which generally encloses the stamens and pistil, in allusion to its shape, which has some resemblance to that of a boat. It sometimes consists of two distinct pieces, but is generally simple, attached to the receptacle, and firmly locked in with the other petals by two long claws. A leaf, a scale, and a nectary are also said to be carinated, or keel shaped, when they are longitudinally hollow above, and have a corresponding, sharpish protuberance underneath.

CARINA is also used by some *Chemists*, for the twentieth part of a drop.

CARINÆ were weepers, or women hired, among the ancient Romans, to weep at funerals: they were thus called from *Caria*, the country whence most of them came.

CARINA, in *Ancient Geography*, a town of Asia, placed by Ptolemy in Media.—Also, a town of Asia Minor in Mysia, or in the *Æolide*; mentioned by Herodotus.—Also, a town of Asia, in Phrygia, towards Galatia. Pliny.—Also, a mountain of the Isle of Crete, which, according to Pliny, was nine miles in circuit.

CARINACOU, in *Geography*. See CARIACOU.

CARINANA, CARINENA, or SARIGNENA, a town of Spain in Arragon, about $4\frac{1}{2}$ miles from Longaris, containing 2036 inhabitants, and two convents.

CARINENTA, in *Entomology*. See PAPILIO.

CARINI, in *Ancient Geography*, a people of Germany, being part of those who were comprehended under the general name of Vandals, and whose habitation was near the Codanus Sinus. Pliny.—Also, a people of Germany, in the vicinity of the Helvetians.—Also, a people of ancient Britain, called *Carenii*, which see.

CARINI, in *Geography*, a town of Sicily, pleasantly situated in a fertile valley, surrounded by high rocks, and in a well cultivated district, abounding in wine, grain of various kinds, olives, and all sorts of fruit. The town is singularly neat, contains 4000, (Swinburne,) or 7000, (De Non,) inhabitants, and gives title of prince to the family of Grua, who inhabit an old Gothic castle seated on a rock. It is distant one mile from the sea-shore, and 18 miles from Palermo. The adjacent territory produces a great quantity of excellent manna, as well as oil and wine. A long ridge, like a rampart, and some remnants of a wall, are said to in-

dicate the site of "Hiccaræ," a city mentioned by Thucydides, as the birth-place of Lais, the most celebrated courtesan in Grecian history, who was carried off when Nicias the Athenian general landed here in his way from Italy, plundered the town, and sold the inhabitants for slaves. Near the land, at some distance round the bay of Carini, lies the *Mole delle Femine*, formerly a place of banishment for criminals.

CARINISH POINT, a cape of Ireland west of Ballydonegan bay, in the county of Cork, and a little east of Dursey Island. It is more frequently called Garinish. N. lat. $51^{\circ}34'$. W. long. $10^{\circ}1'$.

CARINOLA, a town of Naples, in the country of Lavora, the see of a bishop, suffragan of Capua; 13 miles N. E. of Capua.

CARINTHIA, a duchy of Austria, bounded to the east by Stiria, to the north by the same, and the archbishopric of Salzburg, to the west by Tyrol, and to the south by the republic of Venice and Carniola. It derives its name from the ancient Carni, who were a colony of the Celtes, called in later times Carantani and Carinthe; and it was formerly a part of Carnia and Noricum. The country is very mountainous and woody. Its principal mountains are St. Ulrich, St. Helena, St. Veit, St. Laurence, and the mountain of Loihl, which separates Carinthia from Carniola. There are also others, no less lofty, that lie towards Tyrol. These mountains yield very good iron; the iron-mines near Friesach on the north, and in the tract among the springs of the Lyfer, being particularly famous. In the district of Villach are found rich lead mines, a beautiful blue granite, and fire marble, or *lunachelli*. The fertile dales of this country produce wheat and other corn, but not enough for the supply of the inhabitants. Carinthia has a number of lakes, the largest of which is that called Wordtsee, eight miles long, and abounding in fish, and also many rivers, the principal of which are the Drau, issuing out of Tyrol, and traversing Carinthia from east to west; the Gail, the Moll, the Lyfer, the Glan, the Gurk, and the Lavant. The cities of Carinthia, of which Clagenfurth is the capital, are eleven; its market-towns 25; its villages, &c. 28,000; its houses 49,000; its convents 20; clergy 1010; nobles 386; burghers and tradesmen 4753; peasants 27,013; herds of oxen 50,000; protestants, with Upper Stiria, 17,000. The inhabitants are partly descended from the ancient Germans, and partly from the Wends. The archbishop of Salzburg, and the bishop of Bamberg, have considerable territories in this country. The principal manufactures of the country are those of iron and steel. In 1282 the emperor Rudolph I. conferred this duchy as a fief on the count of Tyrol, who entered into a compromise with Albrecht of Austria, by virtue of which, it was to descend, on the extinction of his male issue, to the heirs of Albrecht; and when this happened, in the year 1331, the emperor Lewis of Bavaria recognized this duchy to the Austrian duke Otto, who, in 1335, was invested with it. The duchy is governed by a land-captain; and to the military state of the house of Austria it has been accustomed to contribute annually 637,695 florins. Christianity was introduced into this duchy in the 7th century; and the whole country acknowledges the Roman Catholic church, though it contains many protestants and adherents to the Lutheran doctrine.

Carinthia is divided into Lower and Upper. The principal towns of Lower Carinthia, are Clagenfurth, the capital, St. Veit, Friesach, Volken, St. Andree, Wolfsberg, and Gurk; and those of Upper Carinthia are Villach and Gmund.

CARINUS,

CARINUS, in *Biography*, a Roman emperor, was the eldest son of the emperor Carus, who, soon after his father's election, in the year 282, was admitted, together with his brother Numerian, to a participation of the imperial power; and both, being arrived at manhood, were honoured with the title of Cæsars. Carinus was extremely vicious from his youth, and devoted to dissolute pleasures. He was, however, valiant and active; and, therefore, when his father departed for the prosecution of the Persian war, the young prince was directed, first to suppress some troubles which had arisen in Gaul, and afterwards to fix the seat of his residence at Rome, and to assume the government of the western provinces. Upon the death of Carus, near the close of the year 283, the two brothers, Numerian and Carinus, were unanimously acknowledged as Roman emperors. Born and educated in a private station their sudden elevation required an uncommon share of virtue and prudence; but Carinus was singularly deficient in these qualities. On his arrival at Rome from the Gallic war, he abandoned himself to the luxury of the capital. He blended in his character effeminacy with cruelty, a love of pleasure with a gross and indiscriminating taste, and an indifference to public esteem with consummate vanity. In the course of a few months he successively married and divorced nine wives, most of whom he left pregnant; and whilst he wallowed in the grossest pleasures, he beheld with inveterate hatred those who might remember his former obscurity, or censure his present conduct. He banished, or put to death, the friends and counsellors of his youth; and whilst he affected an arrogant and regal demeanour among the senators, he selected his favourites, and even his ministers, from the dregs of the populace. The palace, and even the imperial table, were filled with singers, dancers, prostitutes, and all the various retinue of vice and folly. Before the death of his father, the conduct of Carinus had filled him with shame and regret, and he determined to set him aside, and to adopt in his place the brave and virtuous Constantius, who was at that time governor of Dalmatia. But a sudden death prevented the execution of his purpose, and afforded his worthless and degenerate son an opportunity of displaying to the Romans the extravagancies of Elagabalus aggravated by the cruelty of Domitian. The unrestricted profusion with which he indulged his propensity to every kind of pleasure, supplied him with the means of exhibiting the Roman games of the theatre, the circus, and the amphitheatre, with uncommon splendour; and the vain prodigality which he manifested in this way was enjoyed by the Roman people with surprise and transport. Upon the death of Numerian, Diocletian was elected emperor by the Roman army, assembled at Chalcedon; and the new emperor, fully apprized of the general dissatisfaction occasioned by the conduct of Carinus, made preparation for a civil war. In the spring of the year 285, the forces of the East and West encountered each other in the plains of Margus, a small city of Mœsia (now Servia), in the neighbourhood of the Danube. The Eastern army had been reduced in number, and its strength had been exhausted; so that it was not in a condition to contend with the legions of Europe. Its ranks, on the first onset, were broken, and Diocletian despaired of the purple and of life. But the advantage which Carinus had obtained by the valour of his soldiers, he soon lost by the infidelity of his officers. A tribune, whose wife the licentious emperor had seduced, seized the opportunity of revenge, "and by a single blow, (says Gibbon,) extinguished civil discord in the blood of the adulterer." Crevier's Rom. Emp. vol. ix. Gibbon's Hist. vol. ii. chap. 12.

CARIOLE, a name given by the Canadians to a sledge,

by which they transport themselves over the snow, from place to place, in the most agreeable manner, and with a degree of celerity that appears almost incredible; for, with the same horse, it is possible to go 80 miles in a day, so light is the draft of one of these carriages, and so favourable is the snow to the feet of the horse. This cariole will hold two persons and a driver, and is usually drawn by one horse. Its shape is varied according to the fancy and taste of the owner. Some are open, and others covered. The former is commonly like the body of a capriole, put upon two iron runners or slides, similar in shape to the rim of a pair of skates: the latter consists of the body of a chariot put on runners in the same manner, and entirely covered with furs. The carioles glide over the snow so smoothly and with so little noise, that it is necessary to have a number of bells attached to the harness, or a person continually sounding a horn to guard against accidents. The rapidity of the motion, and the sound of these bells and horns, conduce much to cheerfulness, for you seldom see a dull face in a cariole. Weld's Travels, vol. i. p. 392.

CARIOPHYLLUM *Saxcum*, in *Zoology*, one of the synonymous names of *madrepora fascicularis*, Gmel.

CARIOUS, the state of a bone putrefied or rotten. See *CARIES*.

CARIPI, a kind of cavalry in the Turkish army. The caripi, to the number of about 1000, are not slaves, nor bred up in seraglios or seminaries, like the rest; but are generally Moors, or renegade Christians, who, having followed adventures, and being poor, and having their fortune to seek, by their dexterity and courage have arrived at the rank of horse guards to the grand signior. They march with the Ulufagi on the left hand, behind him: their pay is twelve aspers per day.

The word *caripi* signifies *poor* and *stranger*; an appellation said by Chalcondylas to have been given them, because chiefly brought out of Egypt, Africa, &c.

CARIPIRA, in *Ornithology*, one of the synonyms of the great frigate bird; *pelecanus aquilus*, Linn. which see.

CARIPOUS, in *Geography*, a people of South America, inhabiting a country to the north of the river Amazon; who are at perpetual war with the Caribbees.

CARIS, in *Ancient Geography*, now *le Cher*, a river of Gaul, called also *Carus*.—Also, one of the names of the isle of Cos.—Also, a town of Phrygia. Steph. Byz.

CARISBROOK *Castle*, in *Geography*, an ancient castle in the isle of Wight, near Newport, where king Charles I. was imprisoned thirteen months. It has a governor and a garrison.

CARISSA, in *Botany*, Linn. Mant. 52. Schreb. 413. Lam. Ill. 330. Willd. 473. Juss. 149. Vent. vol. ii. 431. (Calac. Encyc. Nouv. Hist.) Class and order, *pentandria monogynia*. Nat. ord. *Contorta*, Linn. *Apocina*, Juss.

Gen. Char. *Cal.* very small, five-cleft, acute, permanent. *Cor.* monopetalous, funnel-shaped; tube much longer than the calyx, cylindrical, somewhat ventricose at the throat; border five-cleft, spreading; segments oblong, acute, shorter than the tube. *Stam.* filaments five, very short at the top of the tube; anthers oblong, within the throat. *Pist.* germ superior, roundish; style thread-shaped, the length of the tube; stigma thickish, slightly bifid. *Pericarp.* berry somewhat globular, small, two-celled; partition thin, membranous. *Seeds* solitary, or two together, egg-shaped, somewhat compressed.

Ess. Char. *Calyx* short. *Corolla* funnel-shaped. *Berry* two-celled. Lam. Illust.

* *Thorny*.

Species, 1. *C. carandas*, Linn. Mant. p. 52. Lam. Illust. Pl. 18.

Pl. 118. fig. 1. (*Echites spinosa*, Burm. Ind. 69. *Carandas*, Rumph. Amb. vii. p. 57. tab. 25. *Lycium Malabaricum*, Pluk. Alm. tab. 305. fig. 4.) "Leaves elliptical, obtuse." Linn. "Leaves egg-shaped, mucronate, reticularly veined; segments of the corolla lanceolate." Willd. A shrub. *Stem* fifteen feet high, much branched; branches generally furnished at their knots with straight, stiff, opposite, spreading spines, often simple, sometimes bifid, not perfectly axillary. *Leaves* opposite, entire, smooth, a little coriaceous, on very short petioles. *Flowers* white, resembling those of the common jasmine; peduncles generally trifid. *Berry* dark red, of a pleasant acidulous flavour. La Marck, from a dried specimen. The specimen from which Willdenow formed his description has mucronate leaves; but in La Marck's figure they are perfectly obtuse and entire. A native of the East Indies, where it is made into an excellent sweetmeat. Loureiro found, on the east coast of Africa, a plant which he supposes the same; but, if his description be accurate, it must not only be a different species, but will require a small alteration in the generic character. It is a small tree, about six feet in height, with twisted, spreading, dichotomous branches; branched, not simply; dichotomous spines; egg-shaped, acute leaves, and a one-celled berry, containing many roundish imbricated seeds. 2. *C. salicina*, Lam. Encyc. and Illust. "Leaves lanceolate, oblong, mucronate, growing narrower towards the petiole." A shrub. *Leaves* smooth, shining, veined, only half as broad as in the preceding species, and resembling those of the almond tree; petioles longer. *Spines* opposite, straight, simple, spreading horizontally. *Flowers* smaller. A native of the East Indies, communicated by Sonnerat, but perhaps only a variety. 3. *C. spinarum*, Linn. Mant. 559. Lam. Ill. pl. 118. f. 2. (*Spina spinarum*, Rumph. Amb. vii. p. 76. tab. 19. fig. 1.) "Leaves egg-shaped, acute, veined; segments of the corolla lanceolate-oblong." A shrub, five or six feet high, much branched, spreading. *Branches* slender, cylindrical, dichotomous, somewhat zig-zag. *Spines* in pairs, opposite, generally simple, sometimes bifid, situated at the bifurcations and knots of the stem. *Leaves* scarcely an inch long, resembling those of the myrtle, opposite, egg-shaped, acute, entire, coriaceous, smooth, shining above, finely veined, on very short petioles, so as to appear nearly sessile. *Flowers* terminating, from two to five together on each petiole; tube of the corolla red, cylindrical, a little swelling about the middle; border white, spreading; segments five, lanceolate, acute. *Berry* blackish, about the size of a pea, egg-shaped, two-celled. *Seeds* two in each cell, elliptical, convex on one side, flat on the other. La Marck. A native of the East Indies. Loureiro found a plant in Cochinchina, which he supposed to be the same, and for which, in conjunction with another observed by him in Africa, he formed a new genus. But it differs so much, not only from the description of Linnæus, but also from that of La Marck given above, which was taken from dried specimens both in flower and fruit, that it must be a different plant. See STIGMAROTA. 4. *C. edulis*, Willd. 3. (Antura, Forsk. Desc. 63.) "Leaves egg-shaped, acute, without veins; branches villous near the top; segments of the corolla lanceolate-linear." A native of Arabia Felix. 5. *C. arduina*, Lam. Encyc. and Ill. (*Arduina bispinosa*, Linn. "Leaves heart-egg-shaped, mucronate, nearly without veins, evergreen; spines bifid at the tip. See ARDUINA. La Marck is the first who observed that the arduina and carissa of Linnæus are properly one genus, to which opinion Jussieu has acceded.

** Without thorns.

6. *C. inermis*, Willd. 4. "Leaves egg-heart-shaped,"

Vahl. Symb. iii. p. 43. *Leaves* three times as broad as those of *C. spinarum*, rounded at the base. *Flowers* larger; segments of the calyx bristle-shaped. A native of the East Indies. 7. *C. mitis*, Willd. 5. Vahl. Symb. tab. 59. "Leaves lanceolate, attenuated." A native of the East Indies.

CARISSA, in *Ancient Geography*, a town of Asia Minor, in Paphlagonia. Pliny and Ptolemy.

CARISSA Regia, surnamed *Aurelia*, a town of Spain, in the department of the Gades. The ruins are found in a place called Cariza.

CARISSIMI, in *Antiquity*, a quality or appellation given by the emperors of Constantinople to presidents, governors of provinces, and others.

CARISSIMI, GIACOMO, in *Biography*, a Roman musical composer of the 17th century, whose productions were not only the delight of his contemporaries, but are still sought and hoarded by the curious as precious relics. He was, very early in life, appointed maestro di capella to the German college at Rome, in preference to all other candidates. Alberto delle Valle, an excellent judge of music, speaking of the compositions of Carissimi, which he heard at Rome, without knowing his name, says, that he had heard the vespers performed on Easter Monday, by the nuns only, at the church *dello Spirito Santo*, in florid music, with such perfection as he never in his life had heard before; and on the last Christmas-eve, in attending the whole service at the church of St. Apollinare, where every part of it was performed agreeably to so solemn an occasion; though, by arriving too late, he was obliged to stand the whole time in a very great crowd, he remained there with the utmost pleasure, to hear the excellent music that was performed. In the beginning, he was particularly enchanted by the *Venite exultemus*, which was more exquisite than words can describe. "I know not," says Valle, "who was the author of it, but suppose it to have been the production of the 'Maestro di Capella of that church.'" There was no master in Italy at this time, 1640, whose compositions this description will so well suit, as those of the admirable Carissimi, who was now, in all probability, the Maestro di Capella in question; though so young, that his fame was as yet unfledged; however, it was in composing for this church that he acquired that great and extensive reputation which he enjoyed during a long life, and which his offspring, or musical productions, still deservedly enjoy.

Kircher, in his *Musurgia*, (tom. i. p. 603.) describes his music and its effects in terms of high panegyric; and speaks of him as a master then living, 1650, who had long filled the place of composer to the *Collegio Apollinare* with great reputation. He began to flourish about the year 1635, and, according to Mattheson, was living in 1672. His productions are very numerous, though it does not appear that he ever composed for the theatre.

His sacred and secular cantatas, and motets, have always had admission into every collection of good music. It has been often asserted by musical writers that he was the inventor of cantatas; but it has already been shewn, that these *scene da camera*, or monodies, had a more early origin. Carissimi, however, must be allowed not only the merit of transferring the invention from the chamber to the church, where he first introduced cantatas on sacred subjects, but of greatly improving recitative in general, rendering it a more expressive, articulate, and intelligible language, by its approximation to speech and declamation.

Many of Carissimi's works are preserved in the British Museum, and in Dr. Aldrich's collection at Christ-church, Oxford.

There is something interesting in the most trivial compositions of this admirable master, and in his works may certainly be traced more traits of fine melody than in those of any composer of the 17th century. Of twenty-two of his cantatas preserved in the Christ-church collection, Oxon, there is not one which does not offer something that is still new, curious, and pleasing; but most particularly in the recitatives, many of which seem the most expressive, affecting, and perfect, that we have seen. In the airs there are frequently sweet and graceful passages, which more than a hundred years have not impaired. It is, however, in the *divisions* of this, and of all old music, that the time when it was composed, and the changes of taste, are chiefly discoverable. These are the fashionable forms and trimmings, which soon give way to others; but the principal ground-work, or materials, if good at one time, would not lose their value at another.

Besides Carissimi's numerous secular cantatas, duets, trios, and four-part songs, his compositions for the church, where he first introduced instrumental accompaniments, discover more genius, elegance, and design, than those of any preceding or contemporary composer. Stradella's untimely death perhaps only prevented him from writing as much, and as well, as Carissimi.

Kircher, the contemporary of Carissimi, after a just eulogium on his compositions in general, and telling us that he had the power of exciting in his hearers whatever affection he pleased, speaks of his oratorio of Jephtha, and the new and admirable effects produced in it by his knowledge of harmony, modulation, and happy expression of the passions. The chorus in his sacred drama, *Plorate filia Israel*, which follows the *lamento della figlia di Isepe*, is as remarkable for the accuracy of fugue and imitation, as for its plaintive expression.

According to Mattheson, the famous German composer, Kerl the younger was sent by the emperor from Vienna to Rome, in 1649, to receive lessons from Carissimi; who is said to have acquired a considerable fortune by the exercise of his profession, and to have lived to the age of 90.

He appears to have been the favourite composer and model of Dr. Aldrich, who was possessed of a complete collection of his works, which he scored with his own hand, and seems to have studied with great attention. And Purcell manifestly formed his style on the productions of Carissimi and Stradella, particularly in his recitative and secular songs.

Carissimi was not only a man of superior genius and abilities, but a bold contrapuntist: as we find, in one of his masses, several new harmonies which were thought unwarrantable more than a century after his decease, in 1672. He is much, and justly, praised by Kircher, in his *Musurgia*; his compositions were greatly admired by Dr. Aldrich, who adapted English words to several fine movements in his masses, which were long performed in the chapel of Christ-church college, Oxford.

In a mass, in the key of C, we have a 7th *per saltum*, unprepared, and unresolved on the 8th, the base descending a 3d.

The symphony to this mass resembles so much the overture style of Lulli and Handel, that primogeniture seems to entitle him, and not Lulli, to the invention. Lulli was born in 1633, and, in 1649, when Carissimi was celebrated by Kircher, and organist of the college Apollinare, Lulli was but 16.

Salvini says that this great contrapuntist, when he heard himself praised for his flowing, majestic, noble, and facile style of composition, used to exclaim: "Hah! how difficult it is to acquire this facility!" knowing so well the

pains he had taken in acquiring it: and who, adds Signorelli on this passage, will deny that in the poetry of Metastasio, there is that natural flow and facility of which Horace describes:

Ut sibi quivis

Speret idem, sudit multum, frustra que laboret,
Aufus idem.

Beauty, in works of art, is acquired by great pains and labour, says an old Greek, Πᾶντα χαλεπὰ τὰ καλὰ. The gods fell to mortals whatever is excellent and beautiful, at the price of immense labour and sweat of their brows. Epicharmes, the comic philosopher.

CARISTI, in *Ancient Geography*, a people of Spain, placed by Ptolemy in the Tarragonensis, assigning to them the town of Sueffatium. M. d'Anville places them on the northern coast of Hispania Citerior.

CARISTIA. See CHARISTIA.

CARISTO, CASTEL ROSSO, in *Geography*, a town of European Turkey, in the island of Negropont; the see of a Greek bishop, suffragan of Negropont. It is situated at the southern extremity of the island; 54 miles S.E. of Negropont.

CARISTUM, in *Ancient Geography*, a town of Italy in Liguria, placed by Livy in the territory of the Statilliones. It was little south of Dertona.

CARITAS. The *poculum caritatis*, or grace-cup, was an extraordinary allowance of wine, or other liquors, wherein the religious at festivals drank, in commemoration of their founder and benefactors.

CARITHNI, in *Ancient Geography*, a people of Germany, placed by Ptolemy between the Vangiones and the Vises.

CARITY, in *Geography*, a river of Scotland, which runs into the Esk, in the county of Forfar.

CARIUM, or CURIUM, in *Ancient Geography*, a place in the island of Cyprus, where was the forest of Apollo.

CARIUS, or CORIUS, a river of Asia, in Carmania, the mouth of which is placed by Ptolemy near the Persian gulf.

CARIUS, in *Mythology*, an epithet of Jupiter among the Milesians, probably appropriate to the worship of the Carians.

CARK, or CARKE, in *Commerce*, a certain quantity, or measure, of wool equal to a thirtieth part of a SARPLEAR.

CARL. See CHURL.

CARL *Gustavsd*, or ESCHILSTUNA, in *Geography*, a town of Sweden, in the province of Sudermania; 54 miles W. of Stockholm.

CARLAT, LE, a town of France, in the department of the Arriege, and district of Mirepoix; 22 miles N. of Tarascon.

CARLAT, a town of France, in the department of the Cantal; 5 miles S. E. of Aurillac.

CARLENTINI, a town of Sicily, about 2 miles from Lentini, containing 3000 inhabitants, built by Charles V. with a view of making it the head-quarters of his troops in Italy, and almost ruined by an earthquake. It was placed on an eminence to be out of the reach of the unwholesome vapours of the marshes. The houses are so low, that the streets still resemble a camp.

CARLEPONT, a town of France, in the department of the Oise, and district of Compiègne; 4 miles S. of Noyon.

CARLETON, GEORGE, in *Biography*, a learned bishop in the 17th century, was born at Norham in Northumberland, in 1559, and was chiefly indebted for his education, first in grammar learning and afterwards at the University of Oxford, to the care and liberality of Bernard Gilpin. After

having

having continued many years in the university, where he distinguished himself as a logician, orator, and poet, and more especially as a divine, he was advanced, without any previous ecclesiastical preferment, to the bishoprick of Landaff, to which he was elected in 1617, and consecrated in 1618. In this year he was sent by king James I. to the synod of Dort, and took an active part in the defence of episcopacy. Having given satisfaction by his conduct on this occasion, he was immediately on his return, in 1619, promoted to the see of Chichester, where he remained till his death in 1628. He was a person of solid judgment and various reading, and extolled by Camden for his proficiency in divinity, and in other polite parts of learning. To the Papists he was a bitter enemy, and with regard to the doctrine of predestination a rigid Calvinist: he wrote several books both in Latin and in English, of which the principal are his "*Heroici Characteres*," or Heroic Characters, Oxon. 1603. 4to.; "*Tythes examined*, and proved to be due to the clergy by a divine right," Lond. 1606 and 1611, 4to.; "*Jurisdiction royal, episcopal, papal*, wherein is declared how the Pope hath intruded upon the jurisdiction of temporal princes, and of the church, &c." Lond. 1610, 4to.; "*Consensus Ecclesiæ Catholicæ contra Tridentinos, de Scripturis, ecclesiâ, fide, et gratia, &c.*" Lond. 1613. 8vo. "A thankful remembrance of God's mercy," &c. Lond. 1614, which passed through several editions; "*Astrologimania*" against judicial Astrology, Lond. 1624. 4to.; "*Vita Bernardi Gilpini, &c.*" Lond. 1626, 4to., published in English, Lond. 1629, 4to. and 1636, 8vo. &c. &c. He was also concerned in the Dutch Annotation, and in the new Translation of the bible, undertaken by order of the synod of Dort, but not completed and published till the year 1637. The son of the bishop by his first wife, Mr. Henry Carleton, embraced the cause of the house of Commons in the civil war with king Charles I., accepted a commission in the parliamentary army, and shewed himself to be an enemy to the bishops. He was chosen representative for Arundel in Sussex, in the short Parliament, which met at Westminster in 1640. Biog. Brit.

CARLETON, DUDLEY, viscount Dorchester, an eminent statesman in the 17th century, was the son of Anthony Carleton esq. and born at his father's seat in Oxfordshire in 1573. Having finished his education, at Westminster school and at Christ-church College, Oxford, he travelled abroad for further improvement. After his return, he became secretary to Sir Thomas Parry, ambassador in France, and in 1603 he occupied the same office in the house of the earl of Northumberland. About this time he was also gentleman-usher at court. In the first parliament of king James, he was representative of the borough of St. Mawes in Cornwall, and distinguished himself as an active member and an able speaker. In 1605 he accompanied Lord Norris into Spain, and at the close of this year he was summoned home under a suspicion of being concerned with his former patron, the earl of Northumberland, in the gunpowder-plot; and though on his arrival he was confined, he was very honourably discharged. In 1610, he was appointed ambassador to the court of Brussels, but that embassy not taking place, he was sent in the same capacity to Venice, and previously received the honour of knighthood. During this embassy, he established the character of an able negotiator, and was a principal agent in concluding a treaty between the king of Spain and the duchy of Savoy. He was also instructed to invite the republic of Venice to accede to the league between the king of Great Britain and the protestant Princes of the union in Germany: but his proposal was not accepted. Soon after his arrival in England from Venice, in 1615, he was ap-

pointed ambassador to the States-General: and in this office he spent the most active period of his life, from 1616 to 1628. He was the last who possessed the privilege of a seat in the council of state for the United Provinces, which queen Elizabeth had obtained for her ambassadors. Upon his arrival in Holland he was soon involved in the dispute between the Arminians and Calvinists, which then agitated that country; and the part he took in the politics which gave rise to the synod of Dort, evinced his attachment to the Palatine cause and the public liberty of Germany. Many circumstances occurred in the course of this embassy which rendered his situation peculiarly difficult and trying; but during the progress of them he conducted himself with great firmness and prudence, although the disputes at home between Charles and his parliament, and their dislike to his favourite minister, the duke of Buckingham, thwarted some of the principal plans in which he was engaged. In 1725, sir Dudley Carleton returned to England, and was appointed vice-chamberlain of his majesty's household; and, at the same time, he was joined with the earl of Holland in a negotiation at the court of France, which terminated only in partial success. Upon his return to England he found parliament much agitated by the mismanagement of public affairs; and being chosen as a representative for the borough of Hastings, he endeavoured to allay the ferment that occurred during the prosecution of his patron, the duke of Buckingham. His conduct, however, on this occasion, gave great offence to the friends and supporters of liberty in parliament; but it was very acceptable to an arbitrary court, and procured for him one of the rewards to which he aspired, a seat in the house of peers, by the title of baron Carleton of Imbercourt, in the county of Surry. Soon after, he was sent as ambassador extraordinary to France, for the purpose of excusing and justifying the dismissal of the queen of England's French servants. In this unpleasant negotiation he manifested his usual prudence and address. In 1627 it became necessary for him again to resume his character of ambassador in Holland; but he found the States-General very differently disposed towards this country than they were during his former embassy, nor was he admitted as he had before been into their councils, the ambassador from England having been deprived, by a particular resolution, of his seat in the council of state. He remained, however, in Holland, conducting a variety of interesting negotiations, till he was recalled in 1628. Soon after his arrival he was created viscount Dorchester, and secretary of state. In this capacity he was a principal agent in completing the treaties with France and Spain, and in conducting several foreign transactions, for which he was better qualified than for the internal concerns of the nation, which were now become very intricate and disordered. He seems to have been inclined to arbitrary maxims of government, and to have acquiesced in the dangerous measures of Buckingham, Laud, and others, which widened the breach between the king and parliament. He did not live, however, to witness the disastrous extremity in which they terminated; for having long struggled with the disorders occasioned by frequent returns of the stone and gravel, he died in February 1631-32, in the 59th year of his age, and was interred in Westminster abbey, where a handsome monument is erected to his memory. Carleton wrote a number of letters, speeches, &c. on political topics; but the most valuable of his remains is a series of dispatches while abroad, from which a selection of "*Letters to and from Sir Dudley Carleton during his Embassy in Holland, from January 1615-16 to December 1620*," was published by lord Hardwicke, in one volume 4to. in 1757, with an historical preface: a second edition appeared

in 1775. These letters, allowing for some party prejudices, contain a clear, curious, and interesting account of Dutch affairs, during the period to which they refer, and sundry valuable materials for modern history. Biog. Brit.

CARLIN, CARLINE, or CAROLINE, in *Commerce*, a small silver coin, current in Naples and Sicily, equivalent to about four-pence English.

CARLINA, in *Botany* (quasi Carolina, so called, says Caspar Bauhin, from a tradition that the root was shewn by an angel to Charlemagne as a certain remedy for the plague, which prevailed in his army) Dodonæus, Lobel, Clusius, Cæsalpinus, &c. Tournef. cl. 14. §. 5. gen. 2. Linn. gen. 929. Schreb. 258. Willd. 1437. Juss. 173. Vent. 2. 497. Gært. 940. Carline thistle. Clafs and order, *Syngenesia polygamia æqualis*. Nat. Ord. *Compositæ capitata*; Linn. *Cinarocephalæ*, Juss.

Gen. Ch. *Calyx* common swelling; imbricated; scales numerous, loose, acute; inner ones disposed in a circle, very long, spreading, glossy, coloured, forming a kind of ray to the common flower. *Florets* monopetalous, funnel-shaped, equal, androgynous; tube slender; border five-cleft. *Stam.* Filaments five, capillary, very short; anthers united into a hollow cylinder. *Pist.* Germ short; style filiform, the length of the stamens; stigma oblong, bifid or entire. *Peric.* none, except the permanent contracted calyx. *Seeds* solitary, roundish; down divided into somewhat chaffy, branched, and feathery rays. *Recept.* chaffy; chaff cleft at the tip into several segments.

Eff. Ch. *Calyx* radiated with long, coloured, marginal scales.

Sp. 1. *C. acaulis*, Lam. 1. Bauh. Pin. 380. Tourn. 500. (*C. acanthifolia*, Willd. 2. Mart. 8. Allion. ped. 571. tab. 51. *C. chardouffes*, Vill. delph. 3. p. 30. *Chamæleon albus*, Clus. hist. 2. p. 155. Lob. ic. 2. p. 4.) "Flower very large, nearly sessile; leaves broad, toothed, hoary." Lam. *Root* biennial, thick, oblong, fibrous. *Leaves* petioled, oblong, somewhat sinuated, toothed, spinous at the edges, cottony and white on both sides, spreading widely on the ground. *Flower* from four to six inches in diameter; outer scales of the calyx very spinous; inner ones white above, purplish underneath; receptacle thick and fleshy. A native of dry hills in Italy, Spain, Germany, and the south of France. 2. *C. caulescens*, Lam. 2. Bauh. Pin. 380. Tourn. 500. (*C. elatior*, Clus. hist. 2. p. 155. *C. acaulis*, Willd. 1.) "Stem one-flowered; flower rather large; leaves long, narrow, pinnate, green on both sides; pinnæ gashed and toothed." Lam. *Root* perennial. *Stem* from six to ten inches high, reddish, slightly cottony, leafy, generally simple and one-flowered. *Leaves* very long, especially the lower ones, divided to the midrib. *Flower* terminal, considerably smaller than that of the preceding species. A native of a sandy soil in sheltered situations on the Alps and other countries in Southern Europe. Linnæus considered these two plants as varieties of the same species, as did also Haller and Scopoli, but La Marck asserts that they are perfectly distinct. Both of them have a fleshy receptacle which is eaten by the inhabitants of their native mountains, and is said to equal that of the artichoke in flavour, while at the same time it exceeds it in size. It is, however, not likely to rival that esculent on the tables of the luxurious, as it has been found not to flourish in cultivated ground. The roots of both species are aromatic, and are also used for food when young and tender, but in adult plants they acquire an acrimonious quality, and are then recommended as a diuretic, sudorific, and alexipharmic medicine. The dose of the root, when dry, is from one to two drams; when fresh, from two drams to half an ounce, but is more frequently given in a decoction than in substance. Allion. and Bosc. 3. *C. aggregata*, Willd. 3. Waldst. and

Kitaib. pl. rar. Hung. "Stems simple, one-flowered, numerous, aggregate; leaves pinnatifid, smooth; segments pinnatifid, divaricated, spinous." Willd. *Root* perennial. A native of rocky mountains in Croatia. 4. *C. lyrata*, Willd. 4. Thunb. prod. 141. "Leaves lyrate." A native of the Cape of Good Hope. 5. *C. lanata*, Linn. Spec. 2. Mart. 2. Lam. 2. Willd. 5. (*C. flore purpuro-rubente*, Tourn. 500. *Acarna flore purpuro rubente*, Bauh. pin. 379. Rai. hist. 289. *A. atractylidis folio*, Bar. ic. 483.) "Stem bifid, calyxes blood-red, terminal; the first axillary, sessile." Linn. "Stem often bifid; the intermediate flower sessile; leaves hoary, lanceolate, toothed, spinous." Willd. Whole plant whitish and a little cottony. *Root* annual, small, fibrous, yellowish, odorous, and rather bitter. *Stem* seven or eight inches high, leafy. *Leaves* oblong, edged with yellowish spines; lower ones gashed and pinnatifid; upper ones slightly toothed. *Flowers* surrounded by spinous bractes resembling the leaves, but shorter; outer leaflets of the calyx lanceolate, with only a terminal spine; radiating ones reddish purple, especially underneath. A native of dry and rocky ground in Italy, Spain, and the South of France. 6. *C. involuocrata*, Willd. 6. Desf. atl. 2. p. 251. Poir. it. 2. p. 234. "Stem often bifid; intermediate flower sessile; leaves pinnatifid, toothed, spinous, smooth." Willd. *Root* perennial. *Stem* a foot high, firm, erect. *Leaves* rigid. *Flowers* surrounded by a leafy involucre; ray of the calyx yellow; down sessile, feathery; receptacle chaffy; chaff yellow, longer than the florets. On a dry soil the stem is often one-flowered. A native of Algiers. 7. *C. corymbosa*, Linn. 3. Mart. 3. Lam. 4. Willd. 7. (*C. umbellata apula*, Tourn. 500. *Acarna*, Col. Euphr. 1. tab. 27. *Acarna capitulis parvis luteis in umbella*, Bauh. Pin. 379. Rai. hist. 289.) "Stem many-flowered, sometimes divided; flowers sessile; ray of the calyx yellow." Linn. "Stem many-flowered, smoothish; leaves lanceolate, pinnatifid, toothed, smooth; flowers in a corymb." Willd. *Root* perennial. *Stem* a foot high or more, cylindrical, reddish, moderately cottony, generally simple. *Leaves* alternate, oblong, rather narrow, sometimes a little cottony, pale green. *Flowers* terminal, from three to five, clustered. A native of dry ground in Italy and Provence. 8. *C. sulphurea*, Willd. 8. Desf. atl. p. 251. tab. 224. "Stem dichotomous, woolly; leaves lanceolate, toothed, ciliated with spines pubescent; flowers axillary, nearly sessile." Willd. *Root* annual. Ray of the calyx sulphur-coloured. A native of barren hills about Algiers. 9. *C. hispanica*, Lam. 5. (*Atractylis*, Barrel. ic. 594.) "Stem often divided; branches one-flowered; flowers yellow, terminal." Lam. Whole plant smooth. *Stem* from six to ten inches high, leafy, striated, or angular. *Leaves* alternate, a little pinnatifid, toothed, green, spinous. *Florets* bright yellow; ray of the calyx russet-yellow. A native of Spain. 10. *C. vulgaris*, Linn. 4. Mart. 4. Lam. 7. Willd. 9. Eng. Bot. 1144. Gært. tab. 163. fig. 1. Lam. Illus. pl. 662. "Stem many-flowered, corymbose; flowers terminal; ray of the calyx white; Linn. Stem many-flowered, corymbose, pubescent; leaves lanceolate, toothed, spinous, pubescent underneath." Willd. Whole plant rigid. *Root* biennial, spindle-shaped. *Stem* a foot high, leafy, furrowed, more or less leafy. *Leaves* alternate, sinuated, very spinous, veiny, most woolly underneath. *Flowers* erect; outer calyx-leaves very spinous; inner ones longer, linear, smooth, yellowish white, polished, permanent; florets purplish; anthers with two bristles at their base; scales of the receptacle much resembling the inner ones of the calyx. The leaves and flowers do not decay immediately after the seeds are ripened, but often remain battered and bleached through the whole winter. Dr. Smith. *Receptacle* concave, chaffy;

chaffy; scales of the chaff towards the bottom membranous, keeled, entire, several neighbouring ones united together, so as to leave a hollow in the middle; towards the top cut into numerous bristle-shaped segments, the length of the calyx. *Seeds* small, oblong, narrower downwards, somewhat compressed, or obsoletely angular, inclining to ash-coloured, crowned with a white chaffy ring, and clothed with white silky hairs which are produced beyond the tip; down twice as long as the seed, feathery; rays filiform, two or three often cohering a considerable part of their length, and appearing branched, all united at the base into a ring. *Gart.* In very rocky situations the whole plant is smaller, and bears only one flower. A native of dry heaths and pastures in England, and throughout Europe, flowering in June and July. 11. *C. racemosa*, Linn. 5. Mart. 5. Lam. 6. Willd. 10. (*C. sylvestris minor hispanica*, Clus. Hist. 2. p. 159. Tourn. 500. *Acarna flore luteo patulo*, Bauh. Pin. *Atractylis hisp.* Bar. Ic. 593.) "Flowers sessile, lateral, very few." Linn. "Stem sometimes divided; flowers axillary, sessile; leaves lanceolate, toothed, spinous, pubescent; floral leaves three-nerved." Willd. *Root* annual. *Stem* five or six inches high, slender, simple, leafy, somewhat cottony. *Leaves* rather narrow, whitish green. *Flowers* yellow. A native of a dry soil in Spain and Provence. 12. *C. pyrenaica*, Linn. Sp. Pl. 11. Mart. 6. Lam. 8. Willd. 11. (*Carduus tomentosus*, pyrenaicus, spinosissimus, flore albo, Burf. 21. 43. *Carduus carlinoides*, Gouan. Illust. 62. tab. 23?) "Stem many-flowered; leaves decurrent." Linn. *Leaves* oblong, pinnatifid, cottony on both sides, but most so underneath, armed with strong, yellow spines. *Flowers* terminal, clustered; inner calyx-scales narrow, lanceolate, scarious, white, not forming an open radiating crown as in the other species of this genus, and rather indicating an affinity to the *cardui*; florets reddish, scarcely shorter than the calyx. A native of the Pyrenæes, introduced into Kew garden in 1788 by Dr. John Sibthorp. 13. *C. atractylodes*, Linn. Sp. Pl. 7. Mart. 8. Lam. 9. (*C. polycephalos*, *polyanthæ vulgaris* similis, *æthiopica*; Pluk. Al. 86. tab. 23, fig. 4. Good. Lam.) "Stem branched; calyx spines ciliated." Linn. *Stem* somewhat woody, full of pith, clothed near the top with a very short greyish down. *Leaves* alternate, a little pinnatifid, toothed, very spinous. *Flowers* terminal, floscular, yellowish; calyx scales narrow-lanceolate, spinous, large, radiating, but not scarious and coloured as the European species. A native of the Cape of Good Hope, communicated to La Marck by Sonnerat. 14. *C. gorterioides*, Lam. 10. "Whole plant cottony and very white; leaves blong, deeply cut; teeth narrow, spinous; flowers small, teral, and terminal." Lam. *Leaves* alternate, oblong, rather narrow, pinnatifid; pinnules with narrow teeth, each terminated by a thorn. *Flowers* small, yellowish; calyx spinous inner scales not scarious; florets deeply divided. La Marck observes that this species must belong to the same genus as the preceding, but that they do not well accord with the true Carline thistles. A native of the Cape of Good Hope, communicated by Sonnerat. 15. *C. xeranthemoides*, Ann. jun. Sup. p. 349. Mart. 7. Lam. 11. Willd. 12. "Stem shrubby, branched, tomentous; leaves linear awl-shaped; ferratures spinose; panicles terminal; ray yellow." A handsome shrub. *Stem* cylindrical; branches nearly simple, but divided at the top into leafy peduncles. *Leaves* scattered, not decurrent, green and smooth above, white with wool underneath. *Flowers* in terminal panicles, surrounded by few bracteal leaves, resembling those on the stem, but without spines, and cottony, and not longer than the calyx; inner scales of the calyx rather long, recurved, awl-shaped, spiny; ray bright yellow; scales a

little serrated; florets the size of the ray. Observed by Masson in Barrancas, about Chafna.

The foreign species may be propagated by sowing the seeds in the spring, on a bed of fresh, undunged earth; they should be afterwards thinned, but not transplanted. Most of them will flower the second year, but they seldom ripen their seeds in England, and are not easily preserved.

CARLINA foliis latis ad oras spinis dentatis: Burm. Afr. 154. tab. 55. See *ARNICA crocea*.

CARLINA acaulos gummifera, Bauh. pin. 380. See *ATRACTYLIS gummifera*.

CARLINA minima caulodes, Barr. rar. 1127. tab. 592. See *ATRACTYLIS humilis*.

CARLINA? africana, &c. Pluk. alm. 86. tab. 273. See *ATRACTYLIS oppositifolia*.

CARLINA acaulis minore purpureo flore, Bauh. pin. 380. Rai. hist. 310. *C. minor*, Clus. hist. 2. p. 156. *C. montana*; Barrel. ic. 493. See *CARDUUS acaulis*.

CARLINA foliis imbricatis, &c. Burm. Afr. 151. tab. 54. fig. 1. See *GORTERIA ciliaris*.

CARLINGS, in *Ship-building*, square pieces of timber ranging fore and aft between the deck-beams, into which they are scored; and serving to strengthen the ship, and sustain the smaller beams.

CARLING knees, those timbers between the sides of a ship and the hatchway serving to support the deck on both sides.

CARLINGFORD, in *Geography*, a market and port town of the county of Louth, Ireland, on the south-western side of the bay called from it. This town was formerly distinguished both as a place of strength, and as a sea-port. The castle, founded on a solid rock washed by the sea, is said to have been built by king John; but Cox, with more probability, attributes it to one of the Bourkes or Bourghos, who were earls of Ulster. The town was afterwards walled, and is often mentioned in the historical memoirs of Ireland. It was also a place of good inland trade, and some commerce; but it has considerably declined, and is now remarkable only for its fine-flavoured oysters. Carlingford is a corporate town governed by a mayor and burgeses, and before the union was represented in parliament, but was not of sufficient importance to retain this privilege. It is 11 miles N.E. of Dundalk and 51 N. of Dublin. N. lat. 54° 1'. W. long. 6° 9'.

CARLINGFORD Bay, or *Lough*, a large, well sheltered harbour on the east coast of Ireland, which has good ground, and water sufficient for the largest vessels; but there are several rocks and shoals, that must be carefully attended to when great ships are brought into this harbour. There is a bar on the east side of Blockhouse island, extending about half a mile, on which the least water is eight feet. The west side, between Blockhouse island and Balaghan point, is altogether rocks and shoals, not to be attempted. Carlingford is on the west side of the bay, which is shallow, and dries before low water, but small vessels may lie safe near the town, on soft mud. Newry, which has a small river and canal that joins the bay, derives the chief benefit of this harbour. N. lat. 54° W. long. of the north-eastern point 6° 1'. M^r Kenzie.

CARLISLE, a city of Cumberland, England, is noted in the historic annals of Great Britain as being the scene of repeated sieges and warlike operations between the English and Scottish nations. It was also a place of some consequence during the Anglo-Roman dynasties. "Its Roman colonization," says Camden, "appears plainly from the various evidences of antiquity occasionally dug up, and from the frequent mention of it in the writers of those days: and even after the ravages of the Picts and Scots, it retained something

something of its ancient splendour, and was accounted a city." Soon after the Romans had quitted the island, Carlisle was entirely abandoned to the northern invaders, and by them completely ruined and laid waste. In this state of desolation it remained till the reign of Egfrid, king of Northumberland, who ordered it to be rebuilt, and encompassed it with a wall. He afterwards bestowed it on the celebrated St. Cuthbert, who visited his new acquisition in the year 686, and, according to Bede, "was carried by the towns-people to see their walls, and a fountain, or well, of admirable workmanship, constructed therein by the Romans." St. Cuthbert was bishop of Lindisfarne; and by Egfrid's grant, Carlisle became an appendage to that see, and so continued till the year 1133, when Henry I. constituted it a separate bishopric. During the incursions of the Danes, in the eighth and ninth centuries, Cumberland was exposed to frequent ravages, and this city underwent its full share of calamity, for it was wholly consumed by fire; its inhabitants were massacred, and its walls overthrown. "Its very foundations," says Dr. Todd, "were buried in the earth, so that, it is said, large oaks grew upon them; and this is not only attested by our historians, but also evinced by some discoveries that have lately been made of large unhewn oak trees buried ten or twelve feet below ground." In this desolate state the city remained nearly 200 years, when Walter, a priest, and follower of William the conqueror, repaired a few of the ruined habitations, and attempted to re-establish a religious institution, that had either been founded by St. Cuthbert, or about his time: on this occasion the conqueror issued a mandate, that the inhabitants of Cumberland, but particularly of Carlisle, should be subject to the episcopal jurisdiction of Durham; from "the predecessors of whose diocese they had received christianity." When William Rufus returned from his intended attack on Malcolm, king of Scotland, about the year 1094, he made a visit to this city, and perceiving its importance as a frontier station, gave orders that it should be completely restored, and entrusted the execution of his plan to the above Walter, under whose direction several public edifices were built, a strong fortress erected, and the whole defended by a wall of circumvallation. These buildings are supposed to have been raised by Flemish artificers, a colony of whom was settled here by Rufus, but soon afterwards removed to North Wales, and the isle of Anglesey, and its place occupied by a body of South Britons, who were directed to cultivate the neighbouring lands, and to teach the natives the art of rendering the fertility of the soil conducive to their subsistence. From this era, Carlisle may be regarded both as a military station, and a city; and for several centuries its vicinity to Scotland occasioned it to experience many vicissitudes. Having been ceded by Stephen to the Scottish king, David, about the year 1136, it was made a place of retreat by the latter, after his defeat in the dreadful battle of the Standard, in 1138; and here also he received the pope's legate, Alberic, by whose influence all the female captives that were brought into Carlisle, were set at liberty. "He also obtained from the Scottish leaders a solemn promise, that in future incursions, they would spare the church, and withhold their swords from the aged, from women, and infants; an injunction which humanity dictated, but which the savage customs of the contending nations had not before admitted into the modes of warfare." Carlisle, from this period to the time of Edward I., was subjected to several disastrous events. The 35th year of that monarch, 1307, will be ever memorable in the annals of this city, from the parliament that met here January 20, and continued sitting till the Palm Sunday following, during which

period several important acts were passed, and laws made to promote the expedition which the king was then meditating against the Scots. Edward remained at Carlisle till June 28, when he proceeded towards Scotland, but, being seized with a flux, expired at Burgh-on-Sands, on the seventh of the following month. In 1338, Carlisle was besieged by the Scots, and the suburbs burnt; as was frequently the case during the contentions between the rival houses of York and Lancaster. The wealth of the city was so much reduced by these repeated outrages, that Edward IV. remitted to the inhabitants one half of the ancient annual rent of 80 pounds paid to the crown, and also granted them the lordship of the royal fisheries at Carlisle. The war between Charles I. and his parliament once more involved this city in the horrors of a siege, and the general distress was increased by the calamity of famine. The blockade commenced October 9, 1644, and continued till the ensuing June, when the place surrendered to general Lesley, who commanded for the parliament. During the intermediate time, the wants of the inhabitants and garrison were so great, that not only horses, but even dogs and rats were eaten; and hemp-feed was substituted for bread till that also was consumed; the city was then given up on honourable terms. The last occurrences of this nature, of which Carlisle was the scene, were those which accompanied the rebellion in 1745, when it surrendered, after a short siege, to the forces of the pretender. The situation of Carlisle is extremely fine; it stands on a gentle rising ground, in the midst of extensive and fertile meadows, terminated by the distant mountains, and watered by the Eden, the Caldew, and the Peteril. The two former of these rivers flow on different sides of the city; and their banks and contiguous meadows afford a number of pleasant walks to the inhabitants. In high floods in the winter season the low lands are sometimes inundated, and the city at those periods appears like a promontory, or island rising from the midst of a vast lake. The improvements that have been effected at Carlisle since the union with Scotland, are exceedingly numerous. It was then more celebrated for the strength of its walls, and fortrefs, than either for the neatness of its buildings, or the respectability of its inhabitants: but as the prospect of future commotions vanished, manufactures were introduced, and a taste for improvement accompanied the increase of wealth. This being attended with an augmented population, alterations and improvements were rapidly made. At the commencement of the last century, the dwellings of the inhabitants were mostly formed of wood, clay, and laths, exhibiting singular specimens of poverty and vitiate taste. The gable ends fronted the streets; and the diminutive windows, projecting porches, and clumsy oaken doors, fastened together with large wooden pins, corresponded in form with the gables. The streets were badly paved; and the gutters, or rather trenches, on each side, were so wide and deep, that small bridges were in many parts placed over them for the convenience of passengers. These obstructions have been in a great measure removed, many of the houses have been rebuilt with propriety and even elegance, and many new ones erected in the modern style. Some very material improvements are now making in the entrance to the city. The space included within the walls is somewhat in the form of an irregular triangle; the building however, extends considerably beyond these limits, but is chiefly spread in the vicinity of the city gates which are three in number, and respectively denominated from their contiguity to the English, Irish, and Scottish kingdoms. The English gate is connected with the building called the citadel, which is of an oblong shape, having a round tower at each end, with slender

CARLISLE.

slender openings for the discharge of arrows. These openings are singularly constructed, the apertures diverging outward, but gradually decreasing to the inner side, where they become narrowest. The towers are low, but apparently of great strength; and, together with the gateway, were built by Henry VIII. The city walls are principally formed of squared stone, and on the south and east sides supported by numerous buttresses. Various flights of steps lead to the top, whence the prospects are in many parts extensive and interesting. The public buildings are various; yet those which chiefly engage the curiosity of the visitant, are the castle, and the cathedral. These edifices, or at least certain parts of them, are of considerable antiquity, but have undergone many vicissitudes, and experienced various alterations.

The *castle* stands at the north-west angle of the city, and consists of an outward and inward ward. Within the latter is the great tower, dungeon, or citadel of the castle. This is of a square form, and very lofty, with walls of vast thickness, and constructed according to the modes of defence employed before the invention of cannon. It has since been strengthened according to the modern system, and defended by a half-moon battery and a very large platform, mounted with cannon under cover of the outward wall. The outer ward contains the governor's house; and in one of the gates of the castle the old portcullis is still remaining. This fortress was made the prison of the unfortunate queen Mary, for some time after her landing at Workington, and the apartments wherein she was lodged are still shewn.

The *cathedral* was erected at various periods, and displays specimens of different styles of architecture. Some part of it is apparently as old as the Saxon times, but the greatest portion is more modern. Several parts of the building are extremely beautiful; but on the whole it appears to much disadvantage, having "been curtailed of its fair proportion" in the civil wars, at which period about 30 yards of the nave was pulled down to erect guard-houses and batteries. The opening was afterwards closed with a wall, and the space within the wall, and the transept fitted up as the parochial church of St. Mary, as the entire west end had formerly been; and divine service is regularly performed in it. The arches in this part of the cathedral, and in the transept, are circular, and the shafts extremely massive; the height of each being only 14 feet two inches, while the circumference is 17 feet and a half. The choir was begun by bishop Welton in the reign of Edward III., and finished by the succeeding bishops, Appleby, and Strickland. The expenses were chiefly defrayed by subscription; and indulgences and remissions of penance were also granted to such of the laity as should by money, materials, or labour, contribute to the pious work; copies of various orders and letters patent issued for the occasion are preserved in the bishop's register. Several ancient monuments are remaining in the cathedral, supposed to be for the bishops Welton, Appleby, and two or three others, but uncertain for whom; and on the north side of the choir, near the altar, is a curious monumental brass plate, erected to the memory of bishop Henry Robinson, who was born in this city about the year 1556, and became celebrated for his piety and learning. The whole structure, and indeed most of the buildings in this city, are composed of a coarse, but durable, kind of red free-stone. Bishop Tanner remarks, that "this is the only episcopal chapter in England of the order of St. Austin." Before the dissolution of the monasteries, several religious houses were established in this city; and some few remains are yet visible. The cathedral itself seems to have belonged to a priory. The chapter-house and cloisters stood on the south side of the cathedral, but were pulled down during the civil

Wars. The only church in Carlisle, besides that of St. Mary's in the cathedral, is St. Cuthbert's; this is a plain modern building erected in 1778, on the site of the ancient structure, which appears to have been originally built before the destruction of the city by the Danes. The other edifices for religious worship are three meeting-houses for Protestant dissenters, one for Quakers, one for Methodists, and a Catholic chapel. The three principal streets range nearly in the shape of the Roman Y, and meet at the market place, where the town hall, moot-hall, and council-chamber are situated. Here the assize courts and quarter sessions are held, and most of the public business is transacted. The corporation records are also kept here; and the representatives for the city elected. In this distant part of the kingdom, prisoners are frequently obliged to remain without trial several months, as the assizes are only held once a year. Near the gaol are some buildings called charity-houses, where decayed freemen, and widows of freemen, are permitted by the corporation to live rent-free. The poor are maintained in a workhouse erected by subscription about the year 1760; prior to that time, they were either farmed out, or had a weekly allowance at their own houses. A dispensary was instituted July 1, 1782, for the relief of the indigent sick, and upwards of 15,000 persons are computed to have been relieved since its establishment. Carlisle has received many royal grants, and been invested with great privileges by different monarchs, but nearly all the original charters have been consumed by the fires that have so frequently desolated the city. Charters of confirmation have been granted by Edward III., Henry VII. and VIII., and every succeeding sovereign, to the reign of Charles I., who ordered some alteration to be made in the mode of electing the different officers. The city was first represented in parliament 23 Edward I.: the members are chosen by the free burgesses, who are about 700 in number. The population and buildings of Carlisle and its suburbs, have increased in a very rapid manner during the preceding century; but the augmentation has principally been made within the last 40 years. By the return made under the late population act, the number of houses was found to be 1338, of inhabitants, 10,221. In the year 1761 various new works were established; a company from Newcastle began the calico-printing business which has progressively increased ever since, and now furnishes employment to many hundreds of men, women, and children. There are four print fields, which employ a thousand persons, and pay upwards of 20,000*l.* to the revenue annually. Besides these, there are eight other manufactories; and some of them execute every branch, from preparing the raw materials, to the completion of checks, calicoes, muslins, and all kinds of fancy-work. A brewery has been established, and three others have been lately erected; a soap manufactory has also been built; and so greatly has the trade of the city increased, that the duty paid on licences and exciseable articles amounts to more than 110,000*l.* yearly. Its growing importance is evinced by the establishment of two banks, both of which have been opened within a few years. Carlisle is 303 miles N.W. from London; and has two weekly markets, Wednesday and Saturday. Hutchinson's history of Cumberland, 2 vols. 4to.

CARLISLE, the chief town of Cumberland county, in the state of Pennsylvania, North America, pleasantly and salubriously situated in the post-road from Philadelphia to Pittsburgh, 125 miles W. by N. from the former, and 178 E. from the latter. The town contains about 400 houses, chiefly of stone and brick, and about 1500 inhabitants. The streets intersect one another at right angles; and the public

public buildings are a college, court-house, and gaol, and four edifices for the public worship of the Presbyterians, Germans, Episcopals, and Roman Catholics. Dickinson college has a principal, three professors, a philosophical apparatus, and a library consisting of about 3000 volumes. Its revenue arises from 4000l. in funded certificates, and 10,000 acres of land. N. lat. $40^{\circ} 12'$. W. long. $77^{\circ} 12'$.

CARLISLE Bay, a bay on the west side of the island of Barbadoes, in which stands *Bridge-town*, which see.—Also, a bay of the island of Antigua; three miles W. of Falmouth.—Also, a bay on the south coast of the island of Jamaica. N. lat. $17^{\circ} 47'$. W. long. $77^{\circ} 6'$.

CARLISLES Lagoon, a bay, on the north coast of the island of Egmont, or New Guernsey, in the Southern Pacific Ocean, between How's Point and Portland's Island. S. lat. $10^{\circ} 42'$. E. long. $164^{\circ} 16'$.

CARLOCK, CARLICK, or CHARLOCK, a provincial term sometimes made use of to signify the weed charlock. See **CHARLOCK**.

CARLOCK, in *Commerce*, a sort of fish-glue, or isinglass, imported from Archangel. It is made with the sturgeon's bladder; and is used for clarifying wine, as also in dying. The best comes from Astracan, a city in Muscovy, at the mouth of the river Wolga, where they catch great quantities of sturgeon.

CARLOMAN, in *Biography*, eldest son of Charles Martel, succeeded his father in 741 to the dominion of Austrasia. After many warlike expeditions, which were attended with success, and in which he displayed equal courage and ability, he conceived a disgust with the world, and determined on religious retirement. Accordingly, he made a journey to Rome with a splendid retinue, and having in his own name, and in that of his brother Pepin, presented magnificent gifts to the holy see, he received the clerical tonsure from the hands of pope Zachary in 747. He afterwards retired to a monastery on mount Soracte, where he became a monk of the order of St. Benedict; and withdrawing for greater privacy to the abbey of mount Cassin, he spent his remaining days in the offices of the convent, and the exercises of devotion. He died at Vienne in Dauphiny in 755.

CARLOMAN was also the son of Pepin the Short, and younger brother of Charlemagne, and was consecrated at Soissons, in 768, to the sovereignty of Austrasia, Burgundy, and part of Aquitaine. Being on ill terms with his brother, a serious contest between them was expected to have taken place; but it was prevented by the death of Carloman in 771, which left his brother sole possessor of the French monarchy.

CARLOMAN was also the son of Lewis II., called the Stammerer, and, in conjunction with his brother Lewis III., succeeded his father in 879. France was at this time distracted by intestine competitions for power; and whilst Carloman, assisted by his brother, was besieging Vienne, in a contest with Boson, who had established the kingdom of Arles, or Provence, Lewis was called upon to resist the Normans, who made inroads on the northern side, and died in 882. Carloman, in consequence of this event, was declared king of France, and abandoning the siege of Vienne, marched into Picardy, where with a sum of money he purchased the retreat of the Normans. He was soon afterwards wounded in hunting the wild boar, and died in 884, at the early age of 18, before the consummation of a marriage, which he had contracted with a daughter of Boson.

CARLOMAN was also king of Bavaria, and in 876 succeeded his father Lewis I. king of Germany in the sovereignty of Bavaria, comprising, besides that province, Bohemia, Moravia, Carinthia, Austria, Sclavonia, and part

of Hungary. With the design of annexing Italy to his dominions, he marched his army into the country, but after a partial success in Lombardy, he was induced by a false alarm to abandon the accomplishment of his purpose, though he retained the title of king of Italy. He died of a palsy in 880. Mod. Un. Hist. vol. xix.

CARLONI, GIOV. BATISTA, an eminent painter of history, was a native of Genoa, and having prosecuted the study of his art at Rome and in the school of Passignano at Florence, he became one of the most fertile, original, and seducing machinists of Italy. The most splendid works of this artist, and of his brother Giovanni, are the frescoes of the cathedral del Gualtato at Genoa, which exhibit a wonderful effect of colouring. He survived his brother 50 years, and distinguished himself by this novel style in the churches and collections of Liguria and Lombardy. His powers were very various; and he is said to have possessed equal felicity in oil and fresco, colour and design, velocity and correctness. He had incessant employment, and was unrivalled in diligence and perseverance. After a prolonged life of 86 years, he died in 1680. Pilkington by Fuseli.

CARLOS, in *Geography*, a fort on the north coast of Terra Firma, seated on an island which commands the channel between the gulf of Venezuela and that of Maracaybo on the south, little more than 20 miles N. from the town of Maracaybo.

CARLOS, a town of Veragua, in New Spain, 45 miles S.W. from Santa Fé, situated in a large bay, having a number of small and desert islands at its mouth. N. lat. $7^{\circ} 40'$. W. long. $82^{\circ} 10'$.

CARLOS ST., a town of North America, in the province of Nicaragua, seated on a river which runs from the lake of Nicaragua into the Caribbean Sea. N. lat. $11^{\circ} 46'$. W. long. $66^{\circ} 40'$.—Also, a town of the island of Cuba; 62 miles E. of Havannah.

CARLOSA, a town in the interior part of Brasil, on the south-east side of St. Francis river, and north by west from Villa Nova. S. lat. 15° .

CARLOSTADIANS. See **CAROLOSTADIANS**.

CARLOTTA, LA, in *Geography*, a town of Spain, in the province of Andalusia, built in 1769 for German and Italian emigrants; 15 miles S. of Cordova.

CARLOVINGIANS, in *History*, the title by which the French kings of the second race have been distinguished, and which was first derived from Charles Martel, (see his article,) and commenced with his son Pepin in 752, and terminated with Louis V. in 987. They reckon 14 kings of this family. The mutual obligations, says Gibbon, (Hist. vol. ix. p. 150. &c.) of the popes and the Carolingian family, form the important link of ancient and modern, of civil and ecclesiastical history. On the part of the popes, the most essential gifts which they conferred on the Carolingian race were the dignities of the kings of France, and of patrician of Rome. See **PEPIN** and **CHARLEMAGNE**. On the other hand, the gratitude of the Carolingians was adequate to their obligations, and their names have been consecrated as the saviours and benefactors of the Roman church. Her ancient patrimony of farms and houses was transformed by their bounty into the temporal dominion of cities and provinces; and the donation of the *Exarchate*, (which see,) was the first fruits of the conquests of Pepin.

CARLOW, or CATHERLOUGH, in *Geography*, a county in the province of Leinster, Ireland, which lies between Kildare on the north, Queen's county on the north-west, Wicklow on the north-east, Wexford on the south-east, and Kilkenny on the south-west and west. It is 26 Irish miles (33 Eng.) in length from north to south, and 23 (29 Eng.)

at its greatest breadth, but it narrows to the fourth in the form of a wedge. It contains 137,050 Irish acres, or 214 square miles, (220,098 acres, or 344 square miles English measure,) and 8763 houses, which, at five to each house, would give a population of about 44,000, which is certainly a moderate computation. The number of parishes is 50, none of which are wholly inappropriate; but in consequence of unions they form only 17 benefices, all in the diocese of Leighlin. Some idea may be formed of the religious state of the county from four of these benefices being without a church, and only one of them having a glebe house. The number of members which represent it in the imperial parliament are three, two for the county, and one for the town of Carlow. The river Barrow, which is navigable, runs through this county from north to south, and for many miles forms its western boundary. The woody hills which skirt the northern part present a beautiful and varied scenery. The river Slaney also crosses it in its passage from Wicklow to Wexford. That part of Carlow which lies on the west of the Barrow is covered with rough and high hills. Another mountainous tract continues all along the bounds of Wexford, beginning at the north with the high and rocky mount Leinster, and terminating in that which is called Blackstairs. But the champaign country is very rich and fertile. When Mr. Young was in this county in 1776, he observed cultivation rising up the sides of the mountains; he found also that the hiring tenant was in general the occupier, and that the average rent of the county was 15s. per acre, which was about the average rent of the whole island. Rents, however, have probably risen considerably in consequence of the improved state of the county with respect to inland navigation. The mineralogy of the county is very imperfectly known, but from the account of Mr. D. Stewart, published in the Transactions of the Dublin Society, by which he was employed, there appears to be abundance of marl, lime-stone, gravel, great variety of clays, some of them light and soapy, some iron ore, and a great deal of oxyd of manganese.

Carlow was made a county by king John during his visit to Ireland in 1210, having been before called *Hydrone*, and *Hy-Cavanagh*. It was part of the territory, of which Strongbow acquired the sovereignty by his marriage with Eva daughter of the king of Leinster, confirmed to him by king Henry as supreme lord of Ireland; and it was afterwards held by his descendants, the earls Mareschal. The principal towns are Carlow, Leighlin bridge, and Tullow.

The above article is chiefly taken from Dr. Beaufort's excellent memoir accompanying his map of Ireland; but Mr. Young's tour, and other works, have been consulted. No statistical account of Carlow has been yet published.

CARLOW, a borough and post town, and the assize town of the county of the same name, situated on the river Barrow. It was formerly called Catherlogh, or Catherloch, i. e. *the fortrefs in the lake*, and gave name both to the county and barony in which it is placed. It was early fortified, some say by king John, others by John Constable of Chester, and Hugh de Lacy, whilst the building of the castle is attributed to Eva, the wife, or Isabel, the daughter of Strongbow. It was certainly deemed of some consequence as a fortrefs, and therefore had its full share of the calamities which have for so many centuries devastated Ireland. It does not appear, however, to have been large. Boate speaks of it with contempt, but it has since increased, and was, at the union, deemed worthy of sending a burgess to the imperial parliament. It has a manufacture of a coarse kind of woollen cloth, but it is not considerable. The junction, however, of the grand canal with the Barrow, and

the improved navigation of this river, will probably occasion the further increase of the town. The appearance it makes is cheerful, from the number of white houses scattered up and down in the neighbourhood. It is regularly built, has some good public edifices, and has a neatness superior to most towns in Ireland. The castle is a fine ruin overhanging the Barrow. The Roman Catholics have a large seminary here. Carlow is 39 Irish miles S.W. of Dublin, on the great southern road, in N. lat. 52° 50'. W. long. 6° 58'. Dr. Beaufort's Book of Roads, &c.

CARLOWITZ, a military town of Slavonia, in which the Greek bishop of Slavonia resides; famous for the peace concluded there with the Turks in 1699, and also for its red wine.

CARLSBAD, a town of Bohemia, in the circle of Saatz, on the river Eger, celebrated for its baths of hot water, discovered in 1370 by the emperor Charles IV. as he was hunting; 56 miles W. of Prague.

CARLSBAD, or CAROLINE Waters. These very singular and celebrated hot mineral waters have engaged (as they deserved) the attention of many naturalists and chemists. They are situated at the town of Carlsbad in Bohemia, on the banks of the river Toepel, or Teply, which joins the Eger, a tributary to the Elbe, and were first brought into high repute by the emperor Charles IV. about the year 1370.

There are several springs of this water within a small compass, of which the principal one, called the *Prudel*, (or *Furious*,) issues out with great vehemence in a large body through a natural vault or incrustation of stalactite, which it has formed by long deposition.

The temperature of this fountain is invariably 165° Fahr. at all seasons, and hence it always sends forth a considerable body of steam. Some of the other springs are only 120° to 125°. The taste of this water is strongly alkaline, saline, rather bitter, and strongly chalybeate. It has scarcely any smell, and contains nothing sulphureous.

This water is remarkable for a very rapid deposition of carbonat of lime as it cools, which forms a very hard and beautiful stalactite, or petrification, that incrusts any wood, moss, &c. which happens to remain in it for a day, and soon choaks up any pipe through which it is conducted. Along with the carbonat of lime, the iron which it holds is also precipitated, forming with the former a beautifully variegated stalactite, which takes a high polish.

This water has been analysed by several eminent chemists, and particularly by Bergman, and by Dr. Becher in his elaborate treatise on this spring, and more lately by Klaproth. The latter only we shall give, which however agrees very nearly with the others.

Carlsbad water contains carbonat of soda, sulphat of soda, muriat of soda, and, when still hot, carbonat of lime held in solution by carbonic acid, silice, carbonat of iron, and a portion of uncombined carbonic acid.

It will not be uninteresting to give in a few words the method by which this excellent chemist proceeded in the analysis of this very compounded water.

A given quantity, quite hot from the spring, was first included in a retort of known capacity, and brought to boil, and the boiling continued till no more air-bubbles were given out. The gas was carefully collected over water, and when examined, was found by the test of lime-water to be pure carbonic acid, excepting the portion of common air of the vessels. This way, however, was not quite so accurate as if a mercurial bath had been employed.

The existence of iron in this water, (as in the Bath water,) is only sensible to tests when applied immediately at the spring itself. Under these circumstances, if some of the

fresh water is put into a bottle containing a slice of the gall-nut, a very sensible purple colour is produced immediately. But on cooling, the minute quantity of iron which it contains separates as a fine flocculent whitish-brown oxyd, and the test of galls no longer produces any effect.

To discover the actual quantities of the ingredients, 100 cubic inches of the water were gradually evaporated to a small bulk, during which, an earthy sediment subsided, which was separated by the filtre. This sediment was digested with muriatic acid, which dissolved only a part, and left a loose slimy earth, which proved to be silex. The muriatic solution was then treated with prussiat of potash, which caused a blue precipitate of prussiat iron to subside, after which, the lime that remained in the solution was thrown down by carbonated alkali. The prussian blue therefore indicated the quantity of *oxyd of iron* in the water, and the carbonated alkali reproduced the *carbonat of lime*.

It then remained to separate the salts from the clear solution, being the water lessened to a few ounces by evaporation.

It having been proved by previous tests that the water contained a naked alkali, probably carbonat of soda, and a salt with sulphuric acid, and another with muriatic acid, the basis of which was not an earth, but an alkali, there remained little doubt but that soda was the base in all, (no other freed alkali being ever found in mineral waters.) The only object that remained, therefore, was to estimate the actual quantity of uncombined carbonat of soda, and the quantity of the sulphuric and muriatic acids.

Previous experiments having been made on the power of a given sulphuric acid to saturate soda, some of the same acid was added to the water till an accurate saturation of the naked alkali was produced, by which the quantity of the latter was discovered. The whole was then decomposed by acetited barytes, and the sulphuric acid of the sulphat of barytes formed thereby consisted therefore of the portion of acid added to saturate the uncombined soda, and of that which already existed in the water in the form of sulphat of soda. By subtracting the former portion from the whole quantity of acid indicated by the sulphat of barytes produced, the remainder was the acid belonging to the sulphat of soda in the water originally, whence the proportion of this salt could also be estimated. Lastly, the quantity of muriated soda was found by precipitating the muriatic acid by nitrated silver.

From these experiments it is concluded, that a hundred cubic inches of the Carlsbad water contain,

	grains.
Of dry carbonated soda, - - - - -	39
(equal to $107\frac{1}{2}$ gr. when crystallized.)	
Of dry sulphat of soda, - - - - -	$70\frac{1}{2}$
(equal to 168 gr. crystallized.)	
Of muriat of soda, - - - - -	$34\frac{1}{2}$
Carbonat of lime, - - - - -	12
Silex, - - - - -	$2\frac{1}{2}$
Oxyd of iron, about - - - - -	$\frac{1}{8}$
	<hr/> 158 $\frac{3}{4}$ <hr/>

Of carbonic acid, 32 cubic inches.

The cubic inch of water here used is equivalent to 290 grains of distilled water.

The average quantity of water daily drank by the visitors is not less than about five pints, divided in about fourteen cups. The usual time spent in the use of the water is about four weeks. The water is used in a great variety of disorders.

It is highly serviceable in dyspeptic complaints, obstructions of the abdominal viscera, diseases of the kidneys, and urinary passages, and of the uterine system in females.

The actual quantity of saline matter which is constantly poured out with the water, (almost the whole of which is wasted) is very enormous when the estimate is carried to the supply of water during a year. Dr. Becher estimates the main spring alone to throw out hourly 705 eimers, each eimer being about half a cubic foot; and hence in the year it will throw out 3,087,900 cubic feet. These contain the following quantities of salts, (reduced to pounds avoirdupois.)

Crystallized carbonat of soda,	746,884
----- sulphat of soda,	1,132,923
Muriat of soda, - - - - -	238,209

besides earths and iron, and also 992,529 cubic feet of carbonic acid gas.

It is estimated also that the water of all the other springs united, equals that of the great spring, whence the above numbers may be doubled, and this large quantity has been annually poured out, for a certainty, during 430 years, to the year 1800.

No other advantage is made of this spring by way of manufacture, except that annually some hundred pounds of sulphat of soda are prepared from it.

CARLSBRUN, in *Geography*, a town of Bohemia, in the circle of Chrudim; 6 miles S. of Leutmischl.

CARLSBURG, a village of Germany, in the circle of Franconia, and bishopric of Wurzburg, with a castle, built by Charles the Bald, situate on the Maine, opposite to Carlsstadt.

CARLSRONA, or CARLESCROON, a sea-port town of Sweden, in the province of South Gothland, which derives its origin and name from Charles XI. who laid the foundations of a new town in 1680, and removed the fleet from Stockholm to this place, on account of the advantageous situation, and security of the harbour. The greater part of the town stands upon a small rocky island, which rises gently in a bay of the Baltic; the suburbs extend over another small rock, and along the mole close to the basin, where the fleet is moored. The way into the town from the main land is carried over a dyke, and along two wooden bridges joined by a barren rock. The town is spacious, consisting of some houses of brick, but mostly of wood, and one or two handsome churches, and containing about 18,000 inhabitants. The suburbs are fortified towards the land by a stone wall. The entrance into the harbour, which is naturally difficult, on account of a number of shoals and rocky islands, is secured from the attack of an enemy's fleet by strong forts, built on two islands, under the batteries of which all vessels must pass. A dock, planned by Polhem, has been hollowed in the solid rock; it was begun in 1714, and finished in 1724; but having been found too small, it has been since enlarged, and is capable of receiving a ship of the first rate. Its dimensions are 190 Swedish feet in length, 33 in depth, and 46 in breadth; and it contains 300,000 cubic feet of water, of which it is usually emptied in 10 hours, by the labour of 90 men, who are employed at the same time in pumping, and relieved every half hour. As this is at present the only receptacle of ships under repair, new docks have been projected and begun upon a stupendous plan; in the execution of which it was proposed to construct 30 docks, for building and laying up the largest ships, at the extremity of the harbour. A basin, capable of admitting two men of war, was designed to communicate, by sluices, with two smaller basins, from each of which it was proposed to extend five rows of covered docks; each row being separated by walls of

of stone, and each dock provided with sluice-gates, so as to be filled or emptied by means of pumps. Close to the docks, it has been intended to construct magazines for naval stores, and to inclose the whole with a stone wall. This project was begun in 1757, and resumed by Gustavus III. At the commencement of the works, 25,000*l.* were annually expended; but the sum has been since lessened to about 6000*l.* per annum, and the number of docks reduced to 20. The primary intention of this grand plan was to obtain dry docks, for the purpose of keeping the whole fleet entirely covered from wind and weather. Difficulties have, however, occurred, which have retarded the completion of this work; and in many years they have only finished one dock, the bottom and sides of which are of hewn granite, with rows of granite pillars that support the roof: so that it bears rather the appearance of a colonnade to a temple than a receptacle for ships.

The ships are built at Carlscrona chiefly by English artists; and as the provinces of Blekinge and Skone, though they abound with oaks, do not furnish enough for a continued supply, the Swedes procure their ship-timber from Germany. From their own territories they are supplied with masts and deals, pitch and tar, and the greater part of the flax used in the navy; the ropes and sails are manufactured from Riga hemp. They cast cannon, and make gunpowder with Swedish saltpetre. The harbour of Carlscrona is large and commodious, with depth of water sufficient for ships of the first rate to carry their lower tier of guns. This town is the 10th in order of the towns that vote in the diet. N. lat. 56° 20'. E. long. 15° 26' 15". Coxe's Travels, vol. iv.

CARLSFELD, a mine-town of Germany, in the circle of Erzgebirg, seated on the river Wiltzsch. It was founded in 1678.

CARLSGRAF CANAL. See CANAL.

CARLS-INSUL, *Great and Little*, or *Charles's islands*, lie about a Swedish mile from the coast of the island of Gothland; in which was formerly a quarry of marble, used for building the churches of Gothland.

CARLSKAMN, or CARLSHAVEN, Lat. *Caroli portus*, a sea-port of Sweden, in the province of Blekinge, on the Baltic, built in 1658 by Charles X. and improved and fortified by Charles XI. In this town are a woollen manufacture, a forge for copper, and a timber-yard. It has the 19th vote in the diet, contains about 1200 inhabitants, and is distant 22 miles W. from Carlscrona.

CARLSMARCKT, a town of Silesia, in the principality of Brieg; seated on the river Stover, and 9 miles E. of Brieg.

CARLSRUHE, or KARLSRUH, a town of Germany, in the circle of Swabia and margraviate of Baden, situated in a forest, where the prince has a fine palace and gardens. It was founded by the margrave, Charles-William, in 1715, and is constructed on a regular plan. It consists of one principal street, about an English mile in length, which is at a considerable distance in front of the palace, and in a direction parallel with it. All the other streets go off at right angles from this, and are so arranged, that the view in each of them is terminated by the front of the palace. The houses are as uniform as the streets, being all of equal size and height. Here are four churches, two for Roman Catholics and two for Protestants, a synagogue for the Jews, and about 400 houses. The margrave of Baden has contrived every means in his power to introduce industry and manufactures among his people. Accordingly there is a considerable number of English tradesmen in this place, employed in manufactures similar to those of Birmingham, and instruct the inhabitants in that business. Here are also many watchmakers

from Geneva, whom the prince has engaged to settle in the town by granting them various privileges. Carlruhe is distant 2½ miles N.W. from Durlach, and 11 S. from Philipburg.

CARLSTADT, a town of Sweden, in the province of Warmeland, built on the island of Tingwalla, formed by the two branches of the Clara-Elb river, which, after encompassing it, unite and fall into the lake Wenner. The island is 12 miles, and the town 1½ mile in circumference. It was built by Charles IX. whose name it bears. The streets are broad and straight; and, excepting the cathedral and school, the houses are constructed of wood painted. It is a bishop's see; and the episcopal palace, which is likewise of wood, but not painted, has a front so extensive, and with so many windows, that it appears like a manufactory. The town contains 1500 inhabitants, who carry on a commerce of iron and wood across the Wenner, and import fugar, tea, and spices. It has a linen and woollen manufacture, and in its vicinity is a medicinal spring. In the order of the diet it has the 38th voice, and is a place of considerable trade. N. lat. 51° 21'. E. long. 13° 18'.

CARLSTADT, a town of Germany, in the circle of Franconia, and bishopric of Wurzburg, on the Maine; 12 miles N.W. of Wurzburg.

CARLSTEIN. See MARSTRAND.

CARLUCAT. See CARLUS.

CARLUDOVICA, in *Botany*. Bosc. Nouv. Dict. Flor. Peruv. pl. 31. Class and order, *monæcia polyandria*. Nat. order, *palmæ*.

Gen. Ch. *Cal.* spathe universal; leaflets four, lanceolate, concave, striated, enveloping one another, caducous, terminated by four or five points; spathe common cubical, four-flowered; spathe proper oval, crowned with numerous round teeth. *Cor.* none. *Stam.* in the male flowers numerous, very short, inserted into the receptacle. *Pist.* in the female flowers; germ cubical, hollowed at the top into two furrows crossing each other; styles four, filiform, very long; stigma resembling an anther. *Peric.* berry cubical, one-celled. *Seeds* numerous, small, oblong, even. The male and female flowers are intermingled on the same spadix.

CARLUS, or CARLUX, in *Geography*, a town of France, in the department of the Dordogne, and chief place of a canton in the district of Sarlat; 6 miles E. of Sarlat. The place contains 619, and the canton 5863, inhabitants: the territory comprehends 122½ kilometres and 15 communes.

CARMACÆ, in *Ancient Geography*, a people of European Sarmatia, placed by Pliny in the vicinity of the Palus Mæotis.

CARMAGNOLA, in *Geography*, a fortified town of Piedmont, in the marquise of Saluzzo, which formerly gave the title of count to the eldest son of the marquis. The name is a diminutive of Carmagna, which was a town in its neighbourhood, that sunk in size and importance, whilst the latter, by an accession of its inhabitants, increased. In the war between the French and Imperialists, 1691, it was fortified by the former, and made one of the strongest places on the frontiers of Piedmont. The four fauxbourgs built by the French at some distance from the town are well peopled, and divided into four parishes. Within the walls Carmagnola has only one parish; and the whole number of inhabitants in the fauxbourgs and the town is estimated at 6500. The market is well supplied, and much frequented by persons from the adjacent countries, as well as by the Piedmontese themselves. It is 11 miles S.S.E. of Turin, and 13 N.N.E. of Saluzzo. N. lat. 44° 42'. E. long. 7° 34'.

CARMANA, in *Ancient Geography*, a town of Afia, the capital of Carmania, according to Ptolemy, situated in the interior of the country, in Carmania properly so called, but not far from the desert.—Also, an island, near the coast of Carmania. Steph. Byz.

CARMANDA, *Elmesfana*, a large and flourishing town of Syria, seated on the banks of the Euphrates, according to Xenophon, who relates, that the army stationed on the opposite bank, furnished itself with subsistence in this city by passing the river on rafts. It was situated W. S. W. of Anatho.

CARMANIA, a country of Asia, situate between Persia on the north-west, and Gedrosia on the south-east; and reckoned by some geographers a province of Persia, taken in its greatest extent. According to Ptolemy, Carmania is divided into Carmania the Desert, and Carmania Proper. The former is bounded on the north by Parthia; on the west by Persia; on the east by Drangiana; and on the south by Carmania Proper. The latter has on the south the Indian Ocean; on the west Persia and the Persian Gulf; on the east Gedrosia, and on the north Carmania the Desert. It was inhabited by the Istichæ, Zuthi, Gadanopydres or Ganandopydnæ, Camelobosci, Agdonites or Agdioutes, Rhudianæ, Æres, Charadnæ, Pafargadæ, and Armozæi. The ancient cities were Carmana, now Kerman, Alexandria, Armuza or Armozus, on the shore of the gulf, giving name to a promontory, and to the island of Ormuz, &c. &c. Its rivers were Arapis, Carius, Archidana, Saganus, and Andanis. Its promontories were Armozus and Carpella. Among its mountains Ptolemy distinguishes that which was called Mons Semiramidis, and another under the name of Mons Strongalus. Its dependent isles, in the Persian Gulf, were Sugdiana and Vorocchtha, or Oarocta; and in the Indian Ocean Polla, Carminna and Liba.

Ptolemy makes a very marked distinction between Carmania Desert and Carmania Proper, and the difference between them, indicated by nature, is allowed by Ammianus Marcellinus. As to the first, the appellation given to it by Ptolemy was strictly appropriate; as it had scarcely a town or village in it; its soil being an inhospitable sand, its air hot and unhealthy, and the whole province almost destitute of water. Carmania Proper, on the other hand, was a much more fertile country, producing a variety of very large trees, with the exception, however, of olives. Strabo. lib. xv. It was watered by several rivers, particularly the Andanis, mentioned by Ptolemy and Pliny; although it was mountainous, its mountains had mines of copper and iron. Pomponius Mela, who lived under Tiberius and Claudius, gives a very unfavourable account of the condition of the Carmanians, and of their mode of life; for, speaking of the Carmanians who navigated the Persian Gulf, he says they were destitute of cloathing, corn, cattle, and houses; that they covered themselves with the skins of fishes, and eat their flesh, and that their whole bodies were hairy. Probably this description relates to what Pomponius Mela had heard concerning the inhabitants of the coast of Gedrosia, who were denominated "Ichthyophagi."

In more modern times, however, the province of Carmania has been remarkable for producing sheep, which bear the finest wool in the world; and they are said to have this peculiar property, that, having fed upon new grass from January to May, their fleeces fall off of themselves, and leave the sheep quite naked; when the wool is gathered and beaten, the coarse separates and the fine only remains. The Gaurs have reserved this manufacture to themselves, which consists in girdles much esteemed through the East, and in a sort of serges, as soft and almost as fine as silk. The isle of Ormuz is dependant on this province. See Kerman and Ormuz.

CARMANICUS SINUS, or Gulf of Carmania, the name given by Ptolemy to the Persian Gulf: the sea which washed the coasts of Carmania was called *Carmanium Pelagus*; and the ancient name of mount *Pangeus* was, according to Plutarch, *Carmanius Mons*.

CARMANOR, a name which, according to Plutarch, (*De Fluv.*) was given to the river Inachus; and mount *Tmolus* was, as he says, denominated *Carmanorius mons*, from Carmanor, the son of Bacchus, who had there lost his life in hunting.

CARMARA, a town of India, placed by Ptolemy on this side of the Ganges.

CARMATHIANS, or KARMATIANS, in *History*, an Arabian sect, which bore an inveterate malice against the Mahometans, and which began to occasion disturbances in the year of the Hegira 277, A. D. 890. It is said to have derived its origin from an Arabian preacher of the name of Carmath, in the neighbourhood of Cufa, who assumed the lofty and incomprehensible style of the guide, the director, the demonstration, the word, the holy ghost, the camel, the herald of the Messiah, who had conversed with him in a human shape, and the representative of Mohammed, the son of Ali, of St. John the Baptist, and of the Angel Gabriel. In his mystic volume, the precepts of the Koran were refined to a more spiritual sense; he relaxed the duties of ablution, fasting, and pilgrimage; allowed the indiscriminate use of wine and forbidden food; and nourished the fervour of his disciples by the daily repetition of 50 prayers. The idleness and ferment of the rustic crowd awakened the attention of the magistrates of Cufa; a timid prosecution assisted the progress of the new sect; and the name of the prophet became more revered after his person had been withdrawn from the world. Carmath, or Karmata, contrived by his fanaticism to form a very large party of followers, out of whom he chose 12, as his apostles, to govern the rest, and to propagate his doctrines. The governor of the province seized the prophet, and committing him to prison, swore that he should die; but a damsel belonging to the governor, overhearing this menace, took the key of the dungeon from under her master's head as he slept, and having released the prisoner, returned it to the place from which she had taken it. His adherents took this occasion of reporting, that God had taken the prophet, who had made his escape, into heaven. He appeared afterwards in another province, and declared to his followers, that it was not in the power of any one to do him hurt; notwithstanding which, his courage failing him, he retired into Syria, and was not heard of any more. His sect, however, continued and increased; and his 12 apostles dispersed themselves among the Bedoweens, "a race of men," says Abulfeda, "equally devoid of reason and of religion;" and by the success of their preaching, they threatened Arabia with a new revolution. The Carmathians were ripe for rebellion, since they disclaimed the title of the house of Abbas, and abhorred the worldly pomp of the caliphs of Bagdad. They were susceptible of discipline, since they vowed a blind and absolute submission to their Iman, who was called, in their apprehension, to the prophetic office by the voice of God and the people. Instead of the legal tithes, he claimed the fifth of their substance and spoil; the most flagitious crimes were no more than the type of disobedience; and the brethren were united and connected by an oath of secrecy. After a bloody conflict, they prevailed in the province of Bahrein, along the Persian Gulf; the tribes of the desert were subject to the sceptre, or rather to the sword, of Abu Said and his son Abu Taher; and these rebellious Imams could muster in the field 107,000 fanatics. The mercenaries of the caliph were discomfited in every action; the cities of Racca and Baalbec, of Cufa

Cufa and Bassora, were taken and pillaged; Bagdad was filled with consternation; and the caliph trembled behind the veils of his palace. Abu Taher advanced with 500 horse to the gates of the capital; but being apprised of his danger, and advised to make his escape, the intrepid Carmathian replied to his cautious and timid friend, sent to him by order of the enemy, "Your master is at the head of 30,000 foldiers; three such men as these are wanting in his host;" at the same instant, turning to three of his companions, he commanded the first to plunge a dagger into his breast, the second to leap into the Tigris, and the third to cast himself headlong down a precipice. They obeyed without a murmur. "Relate," continued the Imam, "what you have seen; before the evening your general shall be chained among my dogs." Before the evening, the camp was surprised and the menace executed. The rapine of the Carmathians was sanctified by their aversion to the worship of Mecca; they robbed a caravan of pilgrims, and 20,000 devout Moslems were abandoned on the burning sands to a death of hunger and thirst. Another year they suffered the pilgrims to proceed without interruption; but in the festival of devotion, Abu Taher stormed the holy city, and trampled on the most venerable relics of the Mahometan faith. Thirty thousand citizens and strangers were put to the sword; the sacred precincts were polluted by the burial of 3000 dead bodies; the well of Zemzem overflowed with blood; the golden spout was forced from its place; the veil of the Caaba was divided among these impious sectaries, and the black stone, the first monument of the nation, was borne away in triumph to their capital. After this deed of sacrilege and cruelty, they continued to infect the confines of Irak, Syria, and Egypt; but the vital principle of enthusiasm had withered at the root. Their scruples or their avarice again opened the pilgrimage of Mecca, and restored the black stone of the *Caaba* (which see); and it is needless to inquire into what factions they were broken, or by whose swords they were finally extirpated. It will be sufficient to observe, that the sect of the Carmathians may be considered as one visible cause of the decline and fall of the empire of the caliphs. D'Herbelot, art. *Carmath*. Sale's Koran, Prelim. Discours, p. 184. Gibbon's Hist. vol. x. p. 74, &c. See ABUDHAHER.

CARMEAUX, in *Geography*, a town of France, in the department of the Tarn; two leagues N. of Alby.

CARMEL, in *Ancient Geography*, a mountain of Palestine, or as it has been otherwise called Syria or Phœnicia, situate in the pachalic of Saïde or of Acre, commanding the bay of Acre to the south, and forming one of the most remarkable head-lands on the whole coast of the Mediterranean. It is in the form of a flattened cone, and very rocky, and, as Volney says, about 2000 feet high. This mountain is supposed to have derived its name from its fertility; the word *Carmel*, according to its Hebrew import, signifying the "vine of God" and denoting a fruitful spot, or a place planted with fruit trees. To this purpose Volney informs us, (Travels in Egypt and Syria, vol. ii. p. 228), that among the brambles are still found wild vines and olive-trees, which prove that industry had formerly been employed even on this ungrateful soil. To the south of this mountain, which extends eastward from the sea as far as the plain of Jezreel, or Esdraelon, the country presents a chain of rugged mountains, on the tops of which are many oaks and fir-trees, which furnish a retreat for wild boars and lynxes. At the foot of this mountain, north, runs the brook Kishon, and a little farther the river Belus. Josephus makes Carmel a part of Galilee; in the division of the holy land made by Joshua, it fell to the lot of the tribe of Asher; but this tribe

having remained in captivity with the other tribes of Israel, it returned to the Phœnicians, its original masters, according to St. Jerome.

Carmel is not only the name of the mountain, but of a city which is said to have been built upon it, and of a heathen deity worshipped in it, without either temple or statue, as Tacitus says, (Hist. l. ii. c. 78.), and having only an altar upon which sacrifices were offered to the deity. It is supposed, however, that there must have been some temple upon it, since Jamblichus (in Vit. Pythag.) informs us, that this place was the favourite retreat of Pythagoras, who spent much time alone in the temple. Accordingly the Greeks called it Ὀρος καὶ ἱερὸν Διὸς, the mountain and temple of Jupiter. Suetonius says, that Vespasian ascended this mountain, and offered a sacrifice to the deity of the place, when he came into Syria in order to subdue the Jews who had revolted. This mountain has been celebrated and revered among christians on account of its having been the residence of Elijah, who is supposed to have lived in a cave, which is there shewn, before he was taken up into heaven; and in the summit of it is a chapel dedicated to this prophet, which affords an extensive prospect over the sea and land. This is also said to have been the scene, where Elijah called for a fire from heaven, which consumed the divine sacrifice, thus convincing the Israelites of their folly in hesitating between their God and Baal. (1 Kings, xviii.) On this account the Christians began, from the earliest ages, to manifest a more than ordinary veneration for it; and both the mountain and cave of Elijah, as well as the place where they say his garden was, are visited and revered not only by Christians and Jews, but also by the Mahometans. We are likewise told, that a church with a monastery was erected on this mountain in some of the early ages of Christianity, and that when, by the lapse of time and the fury of its enemies, it was decayed and almost destroyed, a new one was afterwards erected by the zeal of a Calabrian priest, who founded the order of the Carmelites, since spread through all the Roman Catholic countries, and of whom there is still a certain number, living in this ancient monastery. See CARMELITES.

CARMEL was also a city of Palestine in the southern part of the tribe of Judah, seated on a mountain of the same name, which was part of a long chain of mountains, that passed through the southern part of Palestine and near the lower coast of the Asphaltite lake, and bounded the country of the Amalekites. This city was the residence of Nabal the carmelite, Abigail's husband; and it was on this mountain that Saul returning from his expedition against Amalek, erected a trophy. (1 Sam. xv. 11.)

CARMEL, *Knights of Mount*, are a military order of knights Hospitallers, instituted in 1607, by Henry IV. of France, under the title, habit, and rule of *our Lady of Mount Carmel*, and in consequence of a bull of pope Paul V. in 1608, united to the order of St. Lazarus of Jerusalem, with all its commanderies, priories, and other goods for its endowment. The founder proposed it to consist of one hundred French gentlemen, who should be obliged, in times of war, to march close to the kings of France, as their guard. Authors are much divided, whether to call this a new institution, or a restoration of that of St. Lazarus; though it is generally accounted a new institution. See LAZARUS.

CARMEL, in *Geography*, a township of America, in Dutchess county, New York. By the state census of 1796, 237 of its inhabitants were electors.

CARMEL *water*, in *Geography*, a river of Scotland, which runs into the Irvine, in Renfrewshire.

CARME-

CARMELITE WATER. See **CARMES**, *Eau de*.

CARMELITES, or *White Fryars*, or the order of our *Lady of Mount Carmel*, an order of religious, making one of the four tribes of mendicants, or begging friars; and taking both the name and origin from *mount Carmel*, (above described), formerly inhabited by the prophets Elijah and Elisha, and by the children of the prophets; from which this order pretend to descend in an uninterrupted succession.

The manner in which they make out their antiquity has something in it too ridiculous to be rehearsed. Some among them pretend they are descendants of J. C. who, as well as the virgin Mary, are said to have assumed the habit and profession of Carmelites. Others go farther, and make Pythagoras a Carmelite, and the ancient Druids regular branches of their order. The learned Jesuit, Papebroch, was accused before the tribunal of the Roman pontiff, by the Carmelites, on account of his having called in question the dignity and high antiquity of their order. The contest on this subject was long and tedious; but it was so far determined, or at least suspended, in the year 1698, by Innocent XII., that silence was imposed upon the contending parties; although the Carmelites affirm to this very day, that the prophet Elijah was the parent and founder of their ancient community.

Phocas, a Greek monk, speaks the most reasonably; he says, that in his time, viz. in 1185, Elijah's cave was still extant on the mountain; near which were the remains of a building, which intimated there had been anciently a monastery; that some years before, an old monk, a priest of Calabria, whose name was Berthold, by revelation, as he pretended, from the prophet Elijah, fixed there, and assembled ten brothers. In 1205, Albert, patriarch of Jerusalem, gave the solitaries a rigid rule; which Papebroch has since printed. This rule consisted of 16 articles; one of which confined them to their cells, and enjoined them to continue day and night in prayer; another prohibited the brethren having any property; another enjoined fasting from the feast of the holy cross till Easter, except on Sundays; abstinence at all times from flesh was enjoined by another article; one obliged them to manual labour; and another imposed upon them a strict silence from vespers till the tierce the next day. In 1217, or according to others, 1226, pope Honorius III. approved and confirmed this rule; though it was afterwards mitigated by Innocent IV. On the conclusion of the peace between the emperor Frederic II. and the Saracens in 1229, the Carmelites quitted the Holy Land, under Alan the fifth general of the order. Some of them were sent to Cyprus, in 1238, and founded a monastery in the forest of Fortania. Some Sicilians at the same time returned to their own country, and founded a monastery in the suburbs of Messina. St. Louis brought some of these Carmelites with him from the Holy Land into France. Many of the popes gave them the title of "Brothers of the Blessed Virgin."

The Carmelites came into England in the year 1240, and erected a great number of monasteries. Their first houses were at Alnwick in Northumberland, and Aileford in Kent. In England and Wales they had about forty houses. This order is eminent for the devotion of the scapulary, for its missions, and for the great number of saints with which it has stocked the Romish church. In the 17th century, there were four canonizations in this order, viz. of S. Theresa, S. Andrew Corsin, S. Mag. de Pazzi, and S. J. de la Croix.

In the 16th century St. Theresa, a Spanish lady of an illustrious family, undertook the difficult task of reforming the Carmelite order, which had departed much from its primitive sanctity, and of restoring its neglected and violated laws to their original credit and authority. Her associate

in this arduous attempt was Johannes de Santa Crusa, and her enterprise was not wholly destitute of success, notwithstanding the opposition she met with from the greatest part of the Carmelites. Hence the order was, during the space of 10 years, divided into two branches; of which one followed a milder rule of discipline, while the other embraced an institute of the most severe and self-denying kind. The former, viz. *Carmelites of the ancient observance*, were called the *mitigated*, or *moderate*; and the latter, or those of the *strict observance*, were called *Bare-footed Carmelites*.

The *ancient observance* has only one general, under whom are forty provinces; and the congregation of Mantua, which has a vicar-general.

Bare-footed CARMELITES are a reform of the ancient *Carmelites*, set on foot in 1540, by St. Theresa; so called from their going bare-footed.

She began with the convents of nuns, whom she restored to the primitive austerity of the order, which had been mitigated by Innocent IV. in 1245, and at length carried the same reform among the friars. Pius V. approved the design, and Gregory XIII. confirmed the reform in 1580; at the particular desire of Philip II., king of Spain. This separation of the bare-footed Carmelites from those of the ancient observance was confirmed, in 1587, by Sixtus V., and completed, in 1593, by Clement VIII., who allowed the former to have their own chief, or general. But, after having withdrawn themselves from the others, these austere friars quarrelled among themselves, and in a few years their dissensions arrived at such a height, that they were divided anew, by the pontiff last mentioned, into two communities, each of which was governed by its respective general, and had its peculiar constitutions: the one the *congregation of Spain*, divided into six provinces; the other called the *congregation of Italy*, comprehending all the rest, not depending on Spain.

The habit of the Carmelites was at first white, and the cloak laced at the bottom with several lists. But pope Honorius IV. ordered it to be changed for that of the Minims. Their scapulary is a small woollen habit of a brown colour, thrown over their shoulders. Instead of linen shirts, they wear linsy-wolfey, which they change twice a week in the summer, and once a week in the winter.

CARMELO, in *Geography*, a river on the coast of New Albion, S.E. of Francisco bay. N. lat. 36° 55'.

CARMELUM PROMONTORIUM, in *Ancient Geography*, a maritime point of mount Carmel near *Caipha*. See **ACRE**.

CARMELUS, in *Mythology*, a deity of the Syrians, who inhabited the vicinity of mount Carmel. He had an altar, but no temple. Tacitus (Hist. II. 78.) says, that a priest of this deity predicted to Vespasian, that he should be emperor.

CARMEN, an ancient term among the Latins, used, in a general sense, to signify a verse; but in a more peculiar sense to signify a spell, charm, form of expiation, execration, &c. couched in a few words, placed in a mystic order, on which its efficacy depended.

Pezron derives *carmen* from the Celtic *carm*, the shout of joy, or the verses which the ancient bards sung, to encourage the soldiers before the combat; adding, that the Greek *χαρμν* signifies combat and joy; which is true: but then it does not come from the Celtic *carm*, but from *χαρμν*, I rejoice.

Some fetch the origin of the poetical *carmina*, or verses, hence; and say, they took that name from their resemblance to these spells: others, on the contrary, say, that the spells had their origin from the poetical verses, and took their name from their resemblance to those: it is at least certain,

certain, that many of the ancient charms, wherewith diseases were supposed to be cured, were metrical verses, to which, in those ages, greater efficacy was ascribed than to mere words or prose.

Vigenere, again, derives *carmen* from *Carmenta*, because that prophetess couched her predictions in verses, or short periods: but others say, the prophetess took the name *Carmenta* from *carmin*, on the same account.

CARMEN, was anciently a denomination given to precepts, laws, prayers, imprecations, and all solemn formulæ, couched in a few words, placed in a certain order, though written in prose.

In which sense it was, that the elder Cato wrote a "*Car-men de moribus*," which was not in verse, but prose.

CARMEN *faliare*, a set of ancient verses composed by Numa, sung by the SALII, accompanied by the clashing of *Ancylia*, or sacred bucklers. See ANCYLE.

CARMEN also denotes a form of prayer, or words whereby divers among the ancients devoted themselves. Such was that of the Decii, spoken of by Pliny, Hist. Nat. lib. xxxviii. cap. 2.

CARMEN, or *Karmoe*, in *Geography*, an island near the west coast of Norway, about 14 miles long and two broad. N. lat. 59° 30'. E. long. 5° 29'.

CARMENIAN WOOL, a denomination given to a kind of goat's hair, brought from Carmania, or Carmania, a country of Asia Minor. See CARMANIA.

CARMENTALIA, a feast among the old Romans, celebrated annually on the 11th of January, in honour of *Carmenta*, or *Carmentis*, a prophetess of Arcadia, mother of Evander, with whom she came into Italy, 60 years before the Trojan war. After her death she was admitted into the number of the *Dii indigetes* of Rome. Dionysius Hal. and Plutarch say, that Carmenta was the "Themis" of the Greeks. The solemnity was also repeated on the 15th of January, which is marked in the old calendar by *Carmentalia relata*. This feast was established on occasion of a great fecundity among the Roman dames, after a general reconciliation with their husbands, with whom they had been at variance, in regard of the use of coaches being prohibited them by an edict of the senate.

The women celebrated this feast: he who offered the sacrifices was called *Sacerdos Carmentalis*.

Authors are divided about the origin of the word *Carmenta*: Vigenere says, the prophetess was so called *quasi carens mente*, out of her senses; by reason of the enthusiasm she frequently fell into. Others say, she took her name from *carmen*, verse; because her prophecies were couched in verses: but Vigenere, as before noted, maintains *carmen* to be derived from *Carmenta*.

CARMENTALIS PORTA, in *Ancient Geography*, a gate of Rome, situated on the banks of the Tiber, at the foot of the Capitol, in the place called "Montanara." It was also called *Scelerata*, because the 300 Fabians, defeated by the Etruscans, on the banks of the Cremera, made their escape from Rome through this gate.

CARMES, EAU DE, the Carmelite water, or compound balm water, famous in France, and most parts of Europe for its extraordinary cordial virtues. It is said to be extremely reviving, to be good in all sorts of fits, apoplexies not excepted; and to relieve the gout when it attacks the stomach. The Carmelites at Paris, who make considerable advantage by vending this water, keep the preparation of it a great secret. See MELISSA.

CARMINATIVE, in *Medicine*, a denomination formerly applied to those articles of the *Materia Medica*,

which possess the property of dispelling wind from the stomach.

The origin of this absurd term has been ascribed to those times of ignorance and superstition, when the practice of medicine, in the hands at least of fordid and designing men, was intimately connected with magic, jugglery, and other modes of deception; among which, incantations in verse (*carmina*), repeated during or previously to the administration of the remedies, were frequently resorted to. In several nervous disorders, especially in slight hysterical complaints, and in some of the forms of *dyspepsia*, or indigestion, the operation of medicines of this class is extremely quick, their effects are obvious and unequivocal, and the relief which they afford is very considerable: hence they were peculiarly adapted for the accompaniment of incantations. It is not improbable, however, that the term may have been originally adopted in a metaphorical sense. A medicine operating thus quickly, and producing almost instantaneous relief, might be said to operate *like a charm*; and it might therefore be figuratively, but quaintly denominated *carminative*. The word is scarcely to be found in the medical language of the present day.

The substances included under this denomination, are of an aromatic or gratefully stimulant nature; consisting chiefly of the essential oils of vegetables, either pure, or suspended in water by distillation, or combined with volatile salts or other stimulants; of the less active forms of the æthers, or the dulcified spirits, as they were formerly called, &c. The stomach when greatly distended with wind, becomes unable to relieve itself (like the bladder, after a long retention of the urine), partly in consequence of the weakened state of the over-stretched fibres of its muscular coat, and partly, perhaps, from a contraction of the *cardia*, or upper orifice. For, however difficult it may be to explain it, the fact is well known, that a loss of power to act, and a morbidly increased, or spasmodic action, are both consequences of the debility of the muscular fibre. The mode of operation of the *carminative* medicines, therefore, on the contractile coats of the stomach, by which it is relieved from the distension of wind, consists chiefly in exciting to a certain degree of action the distended and weakened muscular coat, by which the accumulated gas is propelled through the upper orifice; but partly also in resolving any slight spasmodic contraction of that orifice, which may exist. For as debility produces, so stimulants counteract, both the diminished and the morbidly great action of the muscular structure.

CARMINE is a beautiful red precipitate of the colouring matter of *Cochineal*, which see.

CARMINIANUM, in *Ancient Geography*, *Carminiano*, a place of Italy, near Aletium, over against Lupia, and before Tarentum, in Messapia.

CARMONA, in *Geography*, a town of Spain, in the province of Andalusia; it was known to the ancients by the name of Carmo, placed in Bætica, to the south of Ilipa, and north-east of Hispalis, and esteemed by Cæsar one of the strongest towns of the country. Philip IV. in consideration of a present of 40,000 ducats, gave it the title of city. It is built on a declivity, looking down upon a rich valley, which is bounded by distant hills, excepting only to the south, where a wide opening gives a passage to the Guadalquivir. It contains 12,685 persons, and includes 7 parish churches, with 5 convents for men, 2 for women, and 2 hospitals; and they reckon in this place more than 100 oil mills: about 20 miles N.E. from Seville, and 40 S.W. from Cordova. N. lat. 37° 24'. W. long. 5° 37'.

CARMONA, a town of Italy, in Friuli, in the county of Goritz, seated on a mountain near the river Indri, and belonging

belonging to the house of Austria. N. lat. $46^{\circ} 15'$. E. long. $5^{\circ} 37'$.

CARMONA, in *Botany*, Bosc. Nouv. Dict. Cavanilles. Class and order, *pentandria digynia*.

Gen. Ch. *Cal.* permanent, with five acute segments. *Corol.* monopetalous: tube short; border with five acute divisions. *Stam.* five. *Pist.* germ superior, globular; styles two: stigmas simple. *Peric.* drupe globular; nut with five cells and five seeds.

Sp. C. *heterophylla*, Cav. Pl. 438. A shrub. *Leaves* alternate, fasciculated on tubercles, oval, oblong, sometimes entire, sometimes three-toothed, dotted with white above, villous underneath, on very short petioles. *Flowers* red, in axillary, villous racemes. A native of the Marianne islands. According to Ventenat, it is nearly allied to Ehretia.

CARMOYLE ROAD, in *Geography*, an anchorage in Belfast loch, on the north-eastern coast of Ireland, where large vessels, which load or unload at that port, usually lie.

CARMULLA, a town of Hindoostan, in the foubah of Dowlatabad; 70 miles N. from Vissapour, and 88 E. from Poonah. N. lat. $18^{\circ} 40'$. E. long. $75^{\circ} 22'$.

CARMYLISSUS, in *Ancient Geography*, a town of Asia Minor, in Lycia, situated in a small valley, at the foot of mount Anticragus; mentioned by Strabo.

CARNA, in *Botany*, Rheed. Mal. 1. p. 107. tab. 59. See LAURUS *Cassia*.

CARNA, in *Geography*, a town of Arabia Felix, according to Ptolemy and Strabo, the latter of whom says, that it was the largest town belonging to the Minocans, a people who inhabited the coast of the Red Sea, and who were neighbours to the Sabæans.—Also, a town of Phœnicia, the “Carne” of Pliny.

CARNABADIUM, in the *Materia Medica* of the ancients, a name given to a drug frequently mentioned by the Greek and Arabian writers.

CARNABAT, in *Geography*, a town of European Turkey, in the province of Romania; 50 miles W. of Burgas.

CARNABORU, a town of Poland, in the palatinate of Red Russia; 60 miles S. of Halicz.

CARNAC, or KARNAC, a village of Egypt, about $1\frac{1}{4}$ mile below Luxor (which see), consisting of miserable cottages, which serve as a foil to the magnificence of the splendid ruins by which they are surrounded. These comprehend obelisks, some of which are very beautiful and well preserved, rows of sphinxes, and a number of termini, composed of basalt, with a dog or lion's head, of Egyptian sculpture, which seemed to serve as avenues to some principal building; mutilated statues; walls covered with historical engraving, which is a representation of men, horses, chariots, and battles; porticoes of great elevation; colonnades of immense size; and colours of astonishing brilliancy; granite and marble; and stones of prodigious dimensions, supported by capitals, and forming the roof of magnificent buildings, &c. &c. Bruce suggests, that Luxor is Diospolis, and that Carnac, together with that place, constituted the “Jovis Civitas magna” of Ptolemy.

CARNÆ, or CARNAPÆ, in *Ancient Geography*, a people placed by Pliny in the European Sarmatia, near the Cimmerian Bosphorus.

CARNAL MANAZEL, in *Geography*, a town of Arabia; 40 miles E.S.E. of Mecca.

CARNALIS, in *Ancient Geography*, a town of Asia, placed by Ptolemy in Armenia Minor.

CARNALLOCH, or CAIRN LOUGH, in *Geography*, lies in the country of Antrim, Ireland, near the mouth of the small

river Glenevy, which falls into Glenarm bay; 2 miles N. of Glenarm, and 108 N. of Dublin.

CARNAMART, a river of the county of Galway, Ireland, which falls into the bay of Galway; it has several branches, one of which proceeds from Loughrea. This river is partly subterraneous, and it forms a turlogh; i.e. a spot which in winter appears as a lake, but in summer is dried up, and reckoned a good sheep-walk.

CARNAPOLE, a factory on the Malabar coast of India, S.S.E. from Cochin.

CARNARIUM, a charnel-house, or repository for the bones of the dead.

CARNASA, or CARSANA, in *Ancient Geography*, a town of India, on this side of the Ganges. Ptolemy.

CARNATIC, or CARNADA, in *Geography*, a country of Hindoostan, lying along the coast of Coromandel, from cape Comorin, in N. lat. about 8° to about 16° . It is bounded on the north by the country of Golconda, on the east by the bay of Bengal, and on the west by the Myfore, Dindigul, and Travencore. The dominions of the late Mahomed Ally, nabob of the Carnatic, and an ally of the East India company, commence on the south of the Guntour Circar, called also Mortizanagur and Condavir, and extend along the whole coast of Coromandel to cape Comorin; including Tanjore, Marawar, Trichinopoly, Madura, and Tenivelly, all being appendages of the Carnatic. Under this description, the Carnatic is not less than 570 British miles in length from north to south, but no where more than 120 wide, and commonly no more than 75. “Such a long narrow tract of country,” says major Rennell, “bordered by an active and powerful enemy, whose territories are, moreover, of a compact form, and his force more readily collected, must always be subject to have its distant provinces cut off from its assistance; or, if it divides its force, for their separate defence, the safety of the whole will be endangered.” The Carnatic, says this ingenious geographer, anciently comprized all that part of the peninsula that lies south of the Gondegama and Toombuddra rivers, from the coast of Coromandel eastward to the Gaut mountains westward, and divided into *Balla-gaut* (which see), and *Payen-gaut*; the former being the western part, and the latter the eastern part, or the Carnatic, according to its present definition. The revenue of the nabob is stated at about a million and a half sterling per annum; out of which he was accustomed to pay a subsidy of 160,000l. per annum, to the East India company, towards the expence of their military establishment. The evils attendant on the improvident conduct of the nabob have been severely felt in past times, and measures have been adopted for guarding against them in future. This nabob has been one of the most ancient, and was supposed to be one of the most faithful, allies of the British nation in India: and Mahomed Ally is said to have been established in the government of Arcot (the capital of the Carnatic), and its dependencies, chiefly by the active co-operation of the British power in India. During the war, in 1780, a combination was formed against the Carnatic, between the French and the famous Hyder Ally, and his successor Tippoo Sultan; and they had made some progress towards the conquest of it, till they were stopped by the interposition of Great Britain. In consequence of this event, it became necessary that an adequate military establishment should be maintained by Great Britain for the defence of that country; and, in 1787, a regular contract was settled to that effect; the nabob Mahomed Ally agreeing to pay an annual subsidy for the support of the troops, amounting to 15 lacks of pagodas. After the war, in

1792, between Great Britain and the late Tippoo Sultan, it was represented to the marquis Cornwallis, that the nabob was unable to discharge these pecuniary engagements, and an indulgent modification of that treaty was framed, which reduced the subsidy to nine lacks of pagodas. In both treaties, however, it was stipulated, that the nabob should contract no alliances, nor enter into correspondence with any European or other power, without the knowledge and concurrence of the British government. Upon the death of Mahomed Ally, in 1793, he was succeeded by his eldest son Omdat ul Omrah. The second son of the nabob, viz. Azum ul Omrah, whose fate is unknown to us, left behind him a son Azzein ul Dowlah, who was kept a prisoner in the palace of the nabob at Chepauk, till the death of his uncle, the late nabob. The nabob Omdat ul Omrah professed that he succeeded to the possession of the territories of his father under all the obligations of the treaties of 1787 and 1792, and a reciprocal friendship subsisted, for some time, between him and the English company. Nevertheless, after the fall of Seringapatam, in 1799, the original records of Tippoo Sultan, as well as his official correspondence, fell into the hands of the British government; and it was discovered, that the nabobs Mahomed Ally and his successor, Omdat ul Omrah, had carried on with Tippoo Sultan a correspondence, inconsistent with, and tending to the subversion of, the alliance between the nabob of the Carnatic and the India company, and incompatible with the security of the British power in the peninsula of India. Hence it was concluded, that these princes had placed themselves in the situation of enemies to Great Britain. As the nabob approached his end, instructions, dated the 5th and 6th of July, 1801, were issued by the government of the East India company, and a party of troops was stationed at the palace of Chepauk, for the purpose of carrying them into effect. On the death of the nabob, an attempt was made to adjust the affairs of the Carnatic, under the direction of lord Clive, governor of Madras. In the mean while Omdat ul Omrah, the nabob, died; and the British agents were informed that he had appointed his reputed son, Taje ul Omrah, commonly called Ally Hussein, then about the age of 18, to be his sole heir. In the course of the negotiation that ensued, it was alleged, on the part of the British agents, that the only adequate security for the rights and interests of the British government in the Carnatic was the entire and exclusive administration of the civil and military authority. To this proposition it was objected, that if this was to be the basis of the arrangement, the station of nabob of the Carnatic must be annihilated, and all the power transferred into the hands of the company. On the other hand, it was replied, that the condition now proposed actually existed in the treaties of 1787 and 1792; and that the object of the proposed arrangement was to secure the rank, dignity, and splendour of the nabobs of the Carnatic, instead of exercising the full rights acquired by the British government. Ally Hussein, with the advice of his two khans, expressed his disapprobation of the terms proposed; and when the treaty with him was brought to this termination, it was resolved, if possible, to open a negotiation with the prince Azeem ul Dowlah; the consequence of which was, that the prince affixed his signature to a Persian draft of the proposed treaty, on the basis of that rejected by Ally Hussein, binding himself to execute a more formal treaty, at the period of his intended installation; and on the following day he was formally introduced to the governor of Madras, as the future nabob of the Carnatic, and conducted to the palace appointed for his residence. Thus the whole substantial power of the Carnatic was vested in the

hands of the India company, and a proclamation was issued expressing the nature and terms of the arrangement. The treaty bears date the 31st of July, 1801, and enjoins that a permanent system for the collection of the revenue, and for the administration of civil and criminal judicature, under the sole and undivided authority of the honourable company, exercised by the governor in council of Fort George, shall be established throughout every village, purgunnah, and province, of the entire territories of the Carnatic.

The British possessions in the Carnatic are confined, chiefly, to the tract called the "Jaghire," which extends along the coast, about 108 British miles, and 47 inland, in the widest part. Its revenue is reckoned 150,000l. Besides the Jaghir, there are lands dependent on Cuddalore; but the amount is not considerable. The whole amount of the land revenue dependent on Madras, including the circars, is stated at 725,000l. per annum. The principal towns of the Carnatic are Arcot, the capital. Madras, Ongole, Pondicherry, Cuddalore, Tanjore, Trichinopoly, Madurai, and Tenivelly. The principal rivers are the Pennar, the Palisar, and the Cauvery. The Carnatic abounds with forts and fortresses of various kinds. Carnatic-gur and Doby-gur are two noted fortresses on the ridge of hills on the west of Arnee.

CARNATION, in *Botany*. See *DIANTHUS caryophyllus*.

CARNATION, *Spanish*. * See *CÆSALPINIA vesicaria*.

CARNATION-grass, in *Agriculture*, a term applied to the finer sorts of grasses, probably from their having this kind of colour in their flowers.

CARNATION-tree. See *CACALIA kleinia*.

CARNATION, among *Dyers*, red rose-colour, for which take liquor of wheat-bran a sufficient quantity, alum three pounds, tartar two ounces; boil them, and enter twenty yards of broad cloth; after it has boiled three hours, cool and wash it: take fresh clear bran-liquor a sufficient quantity, and madder five pounds; boil and sadden according to art.

The Bow-dyers know that the solution of jupiter, or delfed tin, being put in a kettle to the alum and tartar, in another process, makes the cloth, &c. attract the colour into it, so that none of the cochineal is left, but the whole is absorbed by the cloth.

CARNATION, *Flesh-colour*, in *Painting*, is understood of all the parts of a picture in general, which represent flesh; or those parts of the human figure which are naked, and without drapery.

Titian and Corregio, in Italy, and Rubens and Van-Dyke in Flanders, excelled in carnations.

It may be here observed, that the word carnation is not properly used for any particular part of the person painted, but for the whole nudity of the piece. See *COLOURING*.

CARNATUS, in *Ancient Geography*, a river of Asia Minor, in Cataonia.

CARNAWL, in *Geography*, a town of Hindoostan, in the country of Sirhind; 7 miles N.W. of Delhi.

CARNCHUINAIG, a mountain of Scotland, near Kincardine, in the county of Ross.

CARNE, in *Ancient Geography*, a town of Asia, situated on the confines of Phœnicia and Syria, placed by Steph. Byz. in the former, and by Pliny in the latter. Strabo calls it Caranos, and makes it a sea-port of the Aradians.—Also a town of Asia Minor, in the Æolide. Steph. Byz.

CARNE, in *Geography*, a small post town in the county of Donegal, province of Ulster, Ireland, in the northern part

part of the peninsula of Inishowen; 133 Irish miles N.W. from Dublin, and about 18 N.W. from Londonderry. N. lat. $55^{\circ} 16'$. W. long. $7^{\circ} 9'$.

CARNE, a fishing town, or rather village in the peninsula of the Mullet, county of Mayo, Ireland, not far from the isthmus that joins it to the other part of the county. See MULLETT. N. lat. $54^{\circ} 14'$. W. long. $9^{\circ} 50'$.

CARNEA, in *Ancient Geography*, a place of Palestine in Batanea, north-east of mount Galaad, and south-east of Tiberias.

CARNEADES, in *Biography*, an eminent Greek philosopher, the founder as well as an illustrious ornament of the third or new academy, was a native of Cyrene in Africa, and born, according to the most probable supposition, in the 3d year of the 141st Olympiad, B. C. 214. He received his first instructions with regard to the art of reasoning from Diogenes the stoic, and when he became a member of the academy, he attended the lectures of Egefinus, and from him acquired the art of disputing which had been introduced by Arcefilaus. As the successor of Egefinus in the chair of the academy, he contributed to restore its declining reputation. Having occasion to visit Rome, in company with Diogenes the stoic and Critolaus the peripatetic, on an embassy for obtaining the mitigation of a fine inflicted upon the Athenians, by the Sicyonians under the authority of the Romans, for having laid waste Oropus, a town of Bœotia, Carneades and his associates exhibited many specimens of Grecian learning and eloquence, not before known in that city. Carneades excelled in the vehemence and rapid, Critolaus in the correct and elegant, and Diogenes in the simple and modest kind of eloquence. The former having one day harangued, with great variety of thought and copiousness of diction, in praise of justice, before Galba and Cato the censor, undertook next day, with a view of establishing his doctrine of the uncertainty of human knowledge, to refute all his former arguments. He attracted the attention and excited the admiration of his auditors by the subtlety of his reasoning, and the fluency of his language; and the popularity which he acquired alarmed Cato to such a degree that he persuaded the senate to hasten the return of these philosophers to their own schools, lest the Roman youth should lose their military character in pursuit of Grecian learning. In his own school the reputation of Carneades, both as an orator and a philosopher, was so great, that other philosophers, when they had dismissed their scholars, came to hear him. So intent and indefatigable was his application to study, that at his meals he often forgot to take the food that was set before him. Whilst he did justice to the merit of Chrysippus the stoic, he strenuously opposed him; and he used to say, that if there were no Chrysippus, there would be no Carneades, thus acknowledging he owed a considerable degree of his reputation as a disputant to the abilities of his opponent. He possessed extraordinary powers of voice, and was accustomed to speak so loud, that he needed some standard by which to regulate it; but his master told him that he had such a measure or standard in the number of his hearers. As he grew old, he was greatly disturbed by the apprehensions of dying, and frequently lamented, that the same nature which had composed the human frame could dissolve it. After a life prolonged to very advanced age, he closed it in his 85th, as some say, or according to Cicero and Valerius Maximus, in his 90th year. For an account of the doctrine of the new academy, as it was espoused and taught by Carneades, see ACADEMY. Although he opposed the doctrine of the Stoics concerning the gods, he did it, as Cicero says, not with a view to destroy the belief of superior powers, but

merely to prove, that their theological system was unsatisfactory. Avowing likewise his repugnance to their opinion, concerning fate, he assumed, on the ground of experience, the existence of a self-determining power in man, and hence inferred, that all things did not happen, as the Stoics maintained, in a necessary series of causes and effects, and consequently, that it is impossible for the gods to predict events dependent on the will of man. As the foundation of morals, he taught, that the ultimate end of life is the enjoyment of those things, towards which we are directed by the principles of nature. Brucker's Hist. Phil. by Enfield, vol. i. Gen. Dict.

CARNEDDE, in *British Antiquity*, denote heaps of stone supposed to be Druidical remains, and thrown together on occasion of confirming and commemorating a covenant. Gen. xxxi. 46. They are very common in the isle of Anglesey; and were also used as sepulchral monuments, in the manner of *tumuli*: for Mr. Rowland found a curious urn in one of these carnedde. Whence it may be inferred that the Britons had the custom of throwing stones on the deceased. From this custom is derived the Welsh proverb, *Karn ar dy ben*, ill betide thee. Rowland's *Mona Antiqua Restaurata*. See BARROW and BURIAL.

CARNEIA, in *Antiquity*, a festival in honour of Apollo, surnamed Carneus, held in most cities of Greece, but especially at Sparta, where it was first instituted in the 26th olympiad.

The reason of the name, as well as the occasion of the institution, is controverted. It lasted nine days, beginning on the 13th of the month Carneus or Carnius, which see. The ceremonies were an imitation of the method of living and discipline used in camps.

CARNEL. The building of ships first with their timber and beams, and after bringing on their planks, is called *carnel-work*, to distinguish it from clench-work.

Vessels also which go with mizzen-sails instead of main-sails, are by some called *carnels*.

CARNELIAN. See CHALCEDONY.

CARNERA, in *Geography*, one of the smaller Cape Verd islands, which is little more than a rock.

CARNERO, a cape in the South Sea near Santa Maria, on the coast of Peru. S. lat. $1^{\circ} 35'$. W. long. $77^{\circ} 20'$.

CARNESS, a cape of Scotland, on the north coast of the island of Pomona; 2 miles N. of Kirkwall.

CARNESVILLE, the chief town of Franklin county, in the state of Georgia, America, 100 miles N.W. of Augusta; containing a court-house and about 20 dwelling houses.

CARNEW, a small town of the county of Wicklow, Ireland, near the county of Wexford. It makes a despicable appearance, but some linen and much coarse woollens are manufactured in the neighbourhood of it, and its fairs are much frequented. It is 44 miles South from Dublin. N. lat. $52^{\circ} 42'$. W. long. $6^{\circ} 31'$.

CARNEY, a disease in horses, wherein their mouths become so furred that they cannot eat.

CARNI, in *Ancient Geography*, a people who were separated from Norica by the Carnic or Julian Alps. According to Ptolemy they had three cities, "Forum Julium," "Concordia," and "Aquileia." Hence it appears that they occupied a part of the state of Venice. Orosius says that they were a Gaulish nation; and he concurs with the epitome of Livy in saying that they were vanquished in the year of Rome 635, by the consul Quintus Martius Rex.

CARNIA, a name given to the territory at the bottom of the Adriatic gulf, inhabited by the Carni. It corresponded to the Venetian Friuli and a small part of Carniola. —Also, a town of Asia Minor, in Ionia. Steph. Byz.

CARNI-

CARNICOBAR, in *Geography*, the northernmost island of that cluster in the bay of Bengal, called *Nicobars*. It is low, of a round figure, about 40 miles in circumference, and at a distance appears as if it were entirely covered with trees; though there are upon it several well cleared and delightful spots. The soil is a black kind of clay, and marshy; producing, however, abundantly and with little care, most of the tropical fruits, such as pine-apples, plantains, papayas, cocoa-nuts, and arca-nuts; besides excellent yams, and a root called "cachu." The only quadrupeds upon the island are hogs, dogs, large rats, and a large animal of the lizard kind, called by the natives "tolonqui." Of poultry they have only some few hens. The snakes, of various kinds, are numerous, and their bites are frequently fatal to the inhabitants. The timber is plentiful, and of various sorts; some of it is very large, and affords excellent materials for building or repairing ships. The natives are low in stature, but well made and surprisingly active and strong; they are copper-coloured, and their features have a cast of the Malay. The women, in particular, are very ugly. The men cut their hair short, and the women shave their heads, and wear no covering but a short petticoat, made of a sort of rush or dry grass, which reaches half-way down the thigh. The men have only narrow strips of cloth tied tight about their middle. The ears of persons of both sexes are pierced when young, and by squeezing into the holes large plugs of wood, or hanging heavy weights of shells, they render them wide and disagreeable in their appearance. They have enormous appetites, and are addicted to excessive drinking of arrack; and much of their time is spent in feasting and dancing. Their favourite food is pork, eaten almost raw, and their hogs, fed on the cocoa-nut and seawater, are remarkably fat; but they have plenty of small sea-fish, which they strike with their lances. Their common drink is cocoa-nut milk, and a liquor called "soura," which oozes from the cocoa-nut tree after cutting off the young sprouts or flowers. This is suffered to ferment, and thus becomes intoxicating. Whilst the old people smoke tobacco and drink soura, the young sing and dance. Their only musical instrument is a hollow bamboo, about $2\frac{1}{2}$ feet long, and three inches in diameter; along the outside of which is stretched from end to end a single string made of the threads of a split cane, and the place under the string is hollowed a little, to prevent it from touching. This instrument is played upon in the same manner as a guitar; it produces but few notes, and is generally accompanied with the voice. Their houses are commonly built upon the beach, and form villages, each of which consists of 15 or 20; and each house contains a family of 20 persons and upwards. These habitations are raised upon wooden pillars, about 10 feet from the ground; their form is round, and having no windows, they appear like bee-hives covered with thatch. They enter them below by a trap-door and with the help of a ladder, which they draw up at night; thus, and also by bending round the pillars a smooth kind of leaf, they secure their houses from being infested with snakes and rats. The flooring is made of thin strips of bamboo, which are laid at such distances as to admit light and air. The art of making cloth is unknown to the inhabitants of this island; but they procure this as well as hatchets and hanger-blades, in exchange for their cocoa-nuts, which are reckoned the best in this part of India. They have no money, nor do they allow any value to the coin of other countries, except for the purpose of ornaments; and accordingly the young women sometimes hang strings of dollars about their necks. The cloth they purchase, beyond that which they want for their own consumption, is intended for the Choury market.

Choury is a small island to the south of theirs, to which a large fleet of their boats sails every year about the month of November, to exchange cloth for canoes, which they cannot make at home. This voyage is performed by means of the sun and stars; for they have not any knowledge of the compass. In their disposition there are two remarkable qualities; viz. an entire neglect of compliment and ceremony, and an aversion to dishonesty. From their frequent intercourse with strangers they have in general acquired the barbarous language of the Portuguese, so common over India; their own tongue has a sound quite different from most others, their words being pronounced with a kind of stop, or catch in the throat, at every syllable. They have no notion of a God; but they firmly believe in a devil, and worship him from fear. When they are threatened with a storm, they imagine, that the devil intends them a visit, upon which they perform many superstitious ceremonies. When a man dies, his whole live stock, cloth, hatchets, fishing lances, and every moveable thing in his possession, are buried with him; and his death is lamented by the whole village. His wife, according to custom, must consent to have a joint cut off from one of her fingers; and if she refuses, she must submit to have a deep notch cut in one of the pillars of her house. Polygamy is not known in this island; and they punish adultery, by cutting from the man's offending member a piece of the foreskin, proportioned to the frequency or enormity of the crime. Among these people there seems to subsist a perfect equality. Respect is paid to age, but they have no appearance of the exercise of authority one over another. Their society seems to be cemented by mutual obligations continually conferred and received. N. lat. $9^{\circ} 11'$. E. long. $93^{\circ} 18'$. *Asiatic Researches*, vol. ii.

CARNICULA is used by some for a caruncle, more particularly for that fleshy substance which invests the teeth.

CARNID, in *Natural History*, a name given by Averroes to what is called **ZARNICH** by more ancient writers.

CARNIERES, in *Geography*, a town of France, in the department of the North, and chief place of a canton, in the district of Cambray; the place contains 718, and the canton 14,110 inhabitants; the territory comprehends $122\frac{1}{2}$ kilometres, and 16 communes.

CARNIFEX, among the Romans, the common executioner. By reason of the odiousness of his office, the carnifex was expressly prohibited by the laws from having his dwelling house within the city; but lived without the "Porta Metia," or "Esquilina," near the place destined for the punishment of slaves, called "Seftertium," where were erected crosses and gibbets, and where also the bodies of slaves were burnt, or thrown out unburied. The carnifex, (according to some,) was anciently keeper of the prison under the triumph capitals, who had only the superintendence, or care of it; hence, "tradere ad carnificem," to imprison. In middle age writers carnifex also denotes a butcher.

Under our Danish kings, the carnifex was an officer of great dignity; being ranked with the archbishop of York, earl Goodwin, and the lord steward. Flor. Wigorn. ann. 1040. *Rex Hardicanutus Alfricum Ebor. Archiep. Goodwinum comitem, Edricum dispensatorem, Thronum suum carnificem, et alios magnæ dignitatis viros Londinum misit.* Spelm. Gloss. p. 125.

CARNIFICATION, in *Surgery*, is the conversion of bone into flesh; of which process many examples are referred to, and described by medical writers: but in fact, this phenomenon consists only in the absorption of the phosphate of lime, or osseous matter of a bone, leaving the fibrous

brous substance, and consequently producing a flexibility of the bone. This is not strictly a transmutation of bone into flesh, but merely a removal of one of the component parts of bone; viz. that which gives firmness and stability to the ossific system. See *MOLLITIES Ossium*, and the article *BONE*.

CARNIOLA, *duchy of*, in *Geography*, a country of Austria, bounded on the north by Carinthia and Stiria, on the west by Friuli, the county of Gorz, and the Adriatic Sea, on the south by part of Istria and the Adriatic, and on the east by Dalmatia and Croatia. Its name "Krain," or "Crania," was probably derived from Carnia, for which the appellation Carniola was substituted, and used as early as the 8th century. This duchy, in its greatest extent, measures about 120 miles from east to west, and about 100 from north to south. The country is mostly mountainous; some of the mountains being naked, others clothed with wood, and many of them continually covered with snow. The principal of these mountains are the Calenberg, the Lobel, or Lybel, separating Carniola from Carinthia, and affording from its summit a very fine prospect, the Rumberg, the Carst, or Karst, the Birnhaumerwald, anciently "Alpes Juliz," and "Alpes Carniez," (see *ALPS*); also a high and woody mountain extending from the rise of the Saue, through Carniola, into the Turkish dominions, and containing in its least breadth three German miles, and the high mountain of Nanas, lying between Wipach and St. Veit. Among the mountains of this country there are many fruitful vallies and fields, which yield not only good pasturage, but excellent crops of corn, hemp, flax, and millet. It affords likewise good fruit for cyder and perry, chestnuts, walnuts, olive trees, oranges, lemons, citrons, almonds, figs, &c. and vines, the grapes of which supply very good red and white wine. The country also breeds horned cattle and horses in great plenty, and furnishes all sorts of fowl and venison, and also many kinds of fish. The mountains yield iron, lead, and copper. The Carniolian marble is reckoned beautiful. Carniola abounds with immense caves, and other natural curiosities. The chief rivers are the Saue, the Laybach, the Gurk, and the Culpa; and the principal inland lakes are the Feldeffer and Wocheiner, and also Circkknitzer Sea. It has 21 cities, Laybach being the capital, 35 market-towns, 200 castles, 4000 villages, and other settlements, 38 convents, 134 parishes, 66,200 inhabited houses, and 6275 uninhabited houses, 75,788 families, 1504 clergy, 401 nobles, 2069 burghers and tradesmen, and 48,600 peasants. The common people, who are robust and hardy, are of Slavonian extraction, but the nobility are, for the most part, German. Among the common inhabitants, occupying different parts of the country, there is a great difference of manners, dress, and language. The two principal languages are the Slavonic or Windish, and the German. The Christian doctrine was introduced into Carniola about the latter half of the 8th century; and the Lutheran doctrine was admitted in the 16th century; but the inhabitants are now principally Roman Catholics, besides some members of the Greek church. The exports from Carniola are iron, steel, quicksilver, red and white wine, olive-oil, cattle, sheep, cheese, linen, a kind of woollen stuff called "mahalan," Spanish leather, honey, ship-timber, and every kind of wood-work, such as boxes, dishes, trenchers, spoons, knives, &c. The Slavi, called also Winds, or Wends, took possession of this country after the year 548. In the time of Charlemagne and his posterity, it was governed by the dukes of Friuli, and afterwards by those of Carinthia; but under Otto II. it became a peculiar margraviate, probably derived from Otto I. The so-

vereignty of this duchy was afterwards conferred on Frederic II., duke of Austria and Stiria, and in 1231, the country raised itself into a duchy. Afterwards, Albrecht I. mortgaged it to the Carinthian duke Meinhard, but in 1335 it reverted again, together with Carinthia, to the house of Austria, to which it has been ever since united. Towards the maintenance of the military power of the house of Austria, Carniola contributes annually 363,171 florins, 56 kruitzers. This duchy is divided into Upper Carniola, which enjoys a wholesome air and fresh springs, of which Laybach is the capital; Lower Carniola, containing many fruitful vallies and tracts, and yielding an excellent wine, called "marchevcin," the chief town of which is Gurkfeld, or Kerko; Middle Carniola, abounding with villages, though mountainous and deficient in water, the capital of which is Gottschee; Inner Carniola, mountainous, yielding little corn, but furnishing much good wine, the chief town of which is Tybein, or Duin; and Austrian Istria, very fertile in wine, oil, corn, and other articles of subsistence, and consisting of the county of Mitterburg, the seigniory of Cassua, the town of St. Veit, the territory of Trieste, of Idria, that of Tulinio, the county of Gorz, that of Gradisca, and the territory of Aquileja.

CARNION, in *Ancient Geography*, a strong city of Gilead, in Palestine, belonging to the nabî tribe of Manasseh, on the north side of Jordan. It was to this city that Timotheus sent all the women, children, and luggage, when Judas Maccabeus was in full march against him. Hither also, after the defeat of his army, and the loss of 30,000 men, those who escaped the slaughter, being closely pursued by the victorious army of Judas, retreated, and many of them sought refuge in the temple of Atargatis. Judas, however, burnt the temple and those who were sheltered in it; and then setting fire to the rest of the city, they all perished likewise, either by the flames, or by his sword, to the number of 25,000. 2 Macab. xii.

CARNION, or **CARNIUM**, a town of Peloponnesus, in Laconia. Polybius.—Also, the name of a small stream on the southern part of Arcadia, which ran from the south-east to the north-west, and discharged itself into the river Gatheatas.

CARNITZ, in *Geography*, a town of Germany, in the circle of Upper Saxony, and duchy of Pomerania; 5 miles N. of Greiffenberg.

CARNIVAL, or **CARNAVAL**, a season of mirth and rejoicing, observed with great solemnity by the Italians, and particularly at Venice.

The word is formed of the Italian *carnavale*; which Du Cange derives from *carn-a-val*, because the *flesh* is then put into the *pot*, in order to make amends for the season of abstinence ensuing. Accordingly, in the corrupt Latin, he observes, it was called *carnelevamen*, and *carnisprivium*; as the Spaniards still denominate it, *carnes tollendas*.

The carnival time commences from Twelfth-day, and holds till Lent. Feasts, balls, operas, masquerades, riotous, concerts of music, intrigues, marriages, &c. are chiefly in carnival time. During the carnival, St. Mark's place is the grand scene of riot and folly, where mountebanks and various other impostors are allowed to erect their stages, and to practise on the credulity of the crowds who assemble round them. See *VENICE*.

CARNIVOROUS, in *Zoology*, an epithet generally applied to animals of every description that subsist for the most part, or entirely, on animal food. In a more limited sense we understand by carnivorous animals, those only of a savage and voracious nature, assimilating in our ideas some instinctive ferocity of character in the manners of those creatures

tures when seeking and attacking their prey, as well as actually feeding on flesh. We naturally consider, for this reason, among the principal carnivorous animals the lion, the tiger, and the wolf; or among birds, the eagle, and the kite, with a host of other rapacious creatures, upon which nature has bestowed pre-eminent advantages of courage, strength, and arms to aid them in seizing upon, and tearing into pieces, those animals on which they feed: they have either formidable canine teeth, or fangs; claws, or talons; the quadrupeds possessing both, and the birds the latter: fishes with very few exceptions are carnivorous, but their only offensive weapons are the teeth, or in some species the spines and prickles disposed on various parts of the body. Quadrupeds that subsist both on flesh and vegetables are more or less deficient with respect to those characters by which carnivorous quadrupeds are known; and those still more so that subsist entirely on roots, barks, fruits, grays, or other vegetables: the brutæ have no cutting teeth either in the upper or lower jaw; the pecoræ have them only in the lower jaw; and the front teeth of the belluæ are obtuse:—the food of those animals is vegetables.

Desmarest, and other modern French writers on zoology, form a distinct subdivision of their carnassiers, (an order of quadrupeds comprehending most of the Linnæan feræ,) under the title of carnivores. This subdivision comprises the three families of martins, cats, and dogs, in the following order. The *first family*, MUSTELINS, or martes, contains five genera; namely, suricate, mangouste, marte, mouffette, and loutre. Suricate is a genus formed only of a solitary species, viverra tetractyla of Linnæus; the mangouste consists of Linnæan viverræ, and marte of animals separated from both of the Linnæan genera, viverra and mustela. Mouffette consists of viverra mephitis, Linn. and other Linnæan species of viverra; and the last genus, loutre, comprises part of the mustelæ of Linn., and lutra of Erxleben. The *second family* are FELINS, comprehending the two genera, chat (*felis*, Linn.) and civette, (*viverra*, Linn.) The *third family*, CYNOSIENS, contain three genera, hyène, (*canis*, Linn.) fennec, consisting only of one species, (*canis cerdo*, Linn.) and chien, (*canis* of Linnæus,) including the common dog, *familiaris*, wolf, *lupus*, and fox, *vulpes*.

Carnivorous animals are characterized both by their internal organization and their capacity and inclination for the destruction of their prey; their teeth are sharp and pointed, even though situated in the back part of the mouth; and these teeth, denominated *canine*, are so long in most of the beasts of prey, that they pass a considerable way beyond each other when the jaws are closed. The distribution of the enamel which is confined to the superficies of the teeth, renders them extremely hard, and this circumstance, joined to an extraordinary bulk of those muscles, employed in raising the lower jaw, give to carnivorous quadrupeds the power of breaking the strongest bones. The rapacious birds are distinguished by a sharp hard bill, furnished on each side with a pointed process, by which they are enabled to tear asunder the parts of the animals they feed upon.

As the digestion of animal substances is accomplished in a short time, the stomach of the carnivorous tribes has a simple figure without any processes or separations of its cavity to retain its contents, or to delay their passage into the intestines; and as animal food furnishes but little excrement, the intestinal canal is short, and either totally unprovided with those dilatations, which are so remarkable in vegetable eaters, or possesses them only in a slight degree.

Carnivorous animals are further distinguished by the extraordinary strength of their members, which are commonly furnished with sharp claws; these are so contrived, both in

the beasts of prey, and the accipitrine birds, that they turn inwards by the flexion of the limb, or the action of seizing any thing, and are retracted by the extension of the toes; thus giving facility and certainty to the capture and retention of fugitive animals.

The senses of *vision* and *smell* are particularly acute in the carnivorous tribes, as it is by means of them that they discover or seek out their prey.

Carnivorous animals are usually cruel and treacherous in their dispositions; they are even unsocial with respect to their own species; and hence it is that their numbers are so few in comparison to that of the graminivorous kind: if it were not for this wise ordinance of nature, the defenceless orders of animals would soon be devoured, and the carnivorous would become the prey of each other.

It is a dispute among naturalists, whether or not man be naturally carnivorous? Some contend that the fruits of the earth were intended as his sole food; and that it was necessity in some places, and luxury in others, that first prompted him to feed upon his fellow-animals. Pythagoras and his followers looked on it as a great impiety; and strictly abstained from all flesh, from the notion of a metempsychosis; and their successors, the Bramins, continue the same to this day. The consideration Gassendus chiefly insists on, why man should not be carnivorous, is the structure and conformation of our teeth; most of them being either incisores or molitores; not such as carnivorous animals are furnished with, proper to tear flesh; except the four *canini*: as if nature had rather prepared us for cutting herbs, roots, &c. than for eating meat. To which may be added, that when we do feed on flesh, it is not without a preparatory cooking, by boiling, roasting, &c.

To these arguments, Dr. Wallis joins another; which is, that all quadrupeds which feed on herbs or plants have a long colon, with a cæcum at the upper end of it, or somewhat equivalent, which conveys the food, by a long and large progress, from the stomach downwards, in order to its slower passage and longer stay in the intestines. In man, the cæcum is very visible: a strong presumption that nature, which is still consistent with herself, did not intend him for a carnivorous animal.

To the arguments used by Dr. Wallis and others, to prove that man is not naturally carnivorous, Dr. Tyson answers, that if man had been designed by nature not to be carnivorous, there would doubtless have been found somewhere on the globe, people who do not feed on flesh; and as history seems not to furnish any instance of this kind, may we not say, that what is done universally by the whole species, is natural? For what the Pythagoreans did in abstaining from flesh, was on the principle of a transmigration, a mistake in their philosophy, not a law of nature; and though in some countries men feed more sparingly on flesh than in others, this is owing to their own choice, or from religious prejudices. He adds; that carnivorous animals are not always without a colon and cæcum: nor are all animals carnivorous which have those parts; but that the *Sarigue*, or *opossum*, for instance, has both a colon and a cæcum, yet feeds on poultry, and other flesh; whereas the hedge-hog has neither colon nor cæcum, and therefore ought to be carnivorous, yet it feeds principally on vegetables: add, that hogs, which have both, will feed on flesh greedily enough when they can get it; and that rats and mice, which have large cæca, feed on bacon, as well as bread and cheese.

And, from the multitude of carnivorous animals which want those parts, and of non-carnivorous, which have one or both, no safe conclusion can be drawn; since we might as well argue, that because the neat-kind, stag-kind, goat-kind,

kind, and sheep-kind, which live on herbage, have four stomachs, therefore all those which have not four stomachs were not designed by nature to be graminivorous; whereas the horse kind and hare-kind have but one stomach, yet feed on grass like the former; add, that in many animals which live on the same sort of food, the structure of the stomach is found very different; and that in others which live on different foods, ex. gr. on flesh, on fruits, on grass, &c. the stomachs are found so like, that it is difficult to assign any difference between them: and if we cannot make a judgment what food is most natural to an animal from the structure of its stomach, which is the part most concerned in digesting it, much less can we judge from the colon or cæcum, which are parts remote from the stomach, and seem rather as a cloaca for the reception of a fæces, than of use for digesting or distributing the food.

In this, however, as in most other controversies, truth lies between the two extremes; there is an obvious connexion between the conformation of the teeth, stomach, and intestines, and the nature of the food upon which an animal subsists: and according to the rules laid down by comparative anatomists on this subject, man was designed to use a mixed food in common; but if circumstances required it, his organs were adapted to digest either animal or vegetable substances. His teeth are neither calculated for grinding coarse vegetable food, nor for tearing the flesh, or breaking the bones of animals: they are only fitted for masticating such matter when divided by machinery, or prepared by the operation of heat, in the several processes of cooking.

The stomach of man is not very capacious; he does not need a reservoir, even when subsisting exclusively upon vegetables, as his invention always furnishes him with the means of extracting the more nutritive parts; and, on the other hand, his stomach is formed to retain its contents for some time: if it were otherwise constructed, it would only be qualified for the concoction of animal matter.

Further, his intestines, with respect to length and capacity, hold a middle place between those of graminivorous and carnivorous animals, or rather more like the latter, on account of the degree of preparation to which we submit vegetable substances, previous to our eating them, in order to get rid of their indigestible parts.

These observations are consistent with daily observation and experience. The lower classes of people in almost all civilized nations live chiefly upon vegetable diet, and yet no rank in society possesses more bodily strength; and, on the other hand, the inhabitants of those countries in which no steps have been taken to cultivate the soil, subsist almost entirely upon the beasts they hunt down, or the fish their seas or rivers afford.

Man, therefore, in different circumstances, and in different states of society, may be either *graminivorous*, *carnivorous*, or *omnivorous*.

CARNIUS, in *Chronology*, the Syracusan name for the Athenian month *METAGITNION*; which was the second of their year, and answered to the latter part of our July and beginning of August.

CARNO, in *Geography*, a river of North Wales, which runs into the Severn, in Montgomeryshire.

CARNOET, or **CARNET**, a town of France, in the department of the north coast, and district of Guingamp, containing about 1100 inhabitants; 6 leagues S.W. from Guingamp.

CARNONACÆ, in *Ancient Geography*, a people of the north-western part of Ancient Britain, placed by Ptolemy between the Creones and the Careni, and occupying, according to Baxter, that part of Ross which is called Affenshire.

CARNOSA Membrana, } in *Anatomy*; see **PANNICULUS**
CARNOSUS Panniculus, } *Carnosus*, and **MEMBRANE**.
CARNOSITY, in *Surgery*, is a term used by former practitioners to denote a fleshy excrescence or tubercle, supposed to be a frequent cause of obstruction in the urinary canal; but which is now generally believed to consist of a simple constriction in the urethra. See **BOUGIES**, **CARUNCLE**, and **STRICTURE**.

Admitting, however, that such carnosities or caruncles do now and then exist in the urethra, they will require the same plan of treatment as strictures, properly so called; so that no considerable error of a practical nature is likely to ensue from retaining the old opinion. Almost the only remedy we possess, in either case, is the diligent use of *Bougies*.

CARNOSUM folium, in *Botany*. See **LEAF**.

CARNSORE POINT, in *Geography*, the S.E. point of Ireland, in the county of Wexford, and on the coast of St. George's channel, a little to the westward of which point is a cluster of small islands called the Saltees. N. lat. 52° 11'. W. long. 6° 20'.

CARNTOGHER MOUNTAINS, a large mountainous tract in the counties of Tyrone and Londonderry, Ireland.

CARNUS, in *Ancient Geography*, a town of Arabia Felix, belonging to the Sabæans.—Also, a town of Pannonia, on the Danube, according to Ptolemy.

CARNUTÆ, or **CARNUTES**, a people of Gaul, to whom Ptolemy assigns the cities of Autricum or Carnutes, (Chartres) and Cenabum or Genabum (Orleans.) The Carnutes were mentioned long before the time of Cæsar, as Livy reckons them among the Celtic nations which passed the Alps in order to establish themselves in Italy, in the time of the elder Tarquin. They are also called Carnuti or Carnuteni Fœderati, and by Plutarch Carnutini. Their territory was very considerable, since it extended from the Seine to the Loire. Among these people the Druids held their general assemblies.

CARNUTUM or **CARNUNTUM**, a town of the Upper Pannonia, seated on the Danube, according to Pliny and Velleius Paterculus: the Carnus of Ptolemy.

CARO, in *Anatomy*, &c. See **FLESH**.

CARO musculosa quadrata, in *Anatomy*, a muscle so called by Fallopius and Spigelius, but more popularly **PALMARIS brevis**.

CARO, Annibal, in *Biography*, an Italian poet and distinguished scholar, was born in 1507 at Civita Nuova, in the march of Ancona, and as his parents were poor, though reputable, he was under a necessity in his youth, of gaining a subsistence by being domestic tutor to the sons of Luigi Gaddi at Florence, who, duly apprized of his talents, appointed him his secretary, and conferred on him some benefices. After the death of Gaddi, he was taken under the patronage of Pier-Luigi Farnese, who employed him in various commissions of trust, and particularly in a business of importance with the emperor Charles V. at Flanders in 1544. Incurring some danger by the tragical death of the duke Farnese, he took refuge at Parma, where he was kindly received by the duke Ottavio Farnese. He afterwards lived with cardinal Alexander Farnese, in the capacity of his private secretary, and having been promoted by this liberal and powerful patron to several commanderies and benefices, he enjoyed his favour till his death in 1566. The life of Caro was chiefly devoted to pursuits of elegant literature. In his youth he composed some works of the light and humorous kind, and he employed himself in translations from the Greek, and printed Italian versions of Aristotle's rhetoric, two orations of Gregory Nazianzen, and one of St. Cyprian.

Cyprian. He also translated the Pastorals of Longus and Aristotle's History of Animals which was left unfinished. Patronized by the Farnese family, he was enabled to collect a rich cabinet of medals, on which he wrote an extensive treatise that was never printed. His familiar letters are esteemed the most perfect models of ease and elegance in epistolary writing. His Italian poetry has been commended; and his canzonets and sonnets have been particularly celebrated. One of these poetical pieces to the honour of the royal house of France, produced a literary dispute of a very virulent and serious nature. By some severe critical censure passed upon it by Lodovico Castelvetro, a celebrated grammarian, Caro was so provoked, that he wrote a reply so infamously libellous as to fix an indelible stain on his memory, both as a man and a Christian. Castelvetro was accused of procuring the assassination of a young friend of Caro, and Caro was suspected of having used means for subjecting Castelvetro to the inquisition which occasioned his exile from his native country, and the hazard of his life. After the termination of this disgraceful and dreadful quarrel, Caro retired to a small villa at Frescati, where he spent his latter days chiefly in a translation of Virgil's *Æneid* into blank verse, which has been highly applauded, and ranked among those performances which do the greatest honour to Italian literature. It was first published at Venice in 1581; one of the best editions is that of Paris, 2 vols. 8vo. 1765. The "Poems" of Caro were printed at Venice in 1584, 4to. His "Letters" were reprinted at Padua in 1749, 3 vols. 8vo. Tiraboschi, *Nouv. Dict. Hist.*

CARO, *St., Hugo de.* See CONCORDANCE.

CARO, in *Geography*, a town of Italy in the duchy of Montferrat; 16 miles S. of Acqui.

CAROB TREE, in *Botany*. See CERATONIA *Siliqua*.

CAROB is also a goldsmith's small weight, amounting to the 24th part of a grain. It is also called *prime*.

CAROCEDO, in *Geography*, a town of Portugal, in the province of Tras os Montes; 6 miles S. of Outeiro.

CAROCHA, a name which the Spaniards and Portuguese give to a kind of mitre made of paper or pasteboard, on which are painted flames of fire, and figures of demons, worn by those who are condemned to death by the tribunal of the INQUISITION. See ACT of faith.

CAROENON, in *Antiquity*, *καραινων*, or *Carenum*, names given by the Greeks and Romans to wine boiled over a slow fire, till only a half, third, or fourth part remained, and then mixed with honey or spices. Wine thus improved acquired several other names, such as *mustum*, *mulsum*, *sapa*, *defrutum*, &c. At this time the same operation is performed with respect to sack, Spanish, Hungarian, and Italian wines. In Italy, new wine which has been thus boiled, is put into flasks, and used for sallad and fauces. In Naples, it is called "musto collo," but in Florence it still retains the name of "sapa," Plin. l. xxii. c. 2. Columella, de re rustica, l. xii. c. 20.

CAROLA, *Ital.* This musical term in Boccaccio, is synonymous with *Ballata*, which the Crusca Dictionary defines, *Canzone, che si canta ballando*, "a song which is sung and danced at the same time." See BALLAD. This is the sense in which the word *Karole* is constantly used by Chaucer.

These folke of which I tell you so
Upon a karole wenten tho,
I ladie baroled hem, that hight
Gladnesse the blisful and the light,
Well could she sing and lustily,
Done half so well and semely—
And couthe enough for soche doing

As longith unto karolling —

There mightest thou karollis sene

And folke' daunce and merry ben —

Pe code I nevir thennis go

Whiles that I saw hem dauncin so —

CAROLATH, in *Geography*, a town and principality of Silesia, in the circle of Glogau, on the Oder; 3 miles N.N.W. of Beuthen.

CAROLI, among some *Surgeons*, denote venereal pustules on the penis; called also *caries pudendorum*.

CAROLINA, NORTH, in *Geography*, one of the united states of America, bounded on the N. by Virginia, on the E. by the Atlantic Ocean, on the S. by South Carolina and Georgia, and on the W. by the state of Tennessee or Tennesse. It lies between $33^{\circ} 50'$, and $36^{\circ} 30'$, N. lat. and between $76^{\circ} 8'$ and $83^{\circ} 8'$ W. long.; being about 450 miles in length from E. to W. and 180 in breadth; and it contains 52,500 square miles, of which 3,346,000 acres are improved land. Its charter limits gave it a greater extent, as they included the state of Tennessee as far as the river Mississippi, so that its length would be about 758 miles. This state comprehends eight districts, which are divided into three classes, viz. the eastern, containing Edenton, Newbern, and Wilmington; the middle, including Fayetteville, (which see), Hillsborough, and Halifax; and the western, which are denominated Morgan and Salisbury. The three eastern districts lie on the sea-coast, and extend from the Virginia line southward to South Carolina. The five others cover the whole state to the W. of the maritime districts, and most of them extend quite across the state from N. to S. These districts are subdivided into 58 counties in the following manner:

Districts.	Counties.	Districts.	Counties.
Edenton, 9 counties.	{ Chowan	Hillsborough, 9 counties.	{ Orange
	{ Churrituck		{ Chatan
	{ Camdben		{ Granville
	{ Pasquetank		{ Johnston
	{ Perquimins		{ Caswell
	{ Gates		{ Samson
	{ Hertford		{ Wake
	{ Bertie		{ Guilford
	{ Tyrrel		{ Randolph
Wilmington, 8 counties.	{ New Hanover	Salisbury, 8 counties.	{ Rowan
	{ Brunswick		{ Mecklenburg
	{ Cumberland		{ Rockingham
	{ Robinson		{ Surry
	{ Duplin		{ Montgomery
	{ Beaden		{ Anson
Newbern, 8 counties.	{ Wayne	Morgan, 7 counties.	{ Wilkes
	{ Moore		{ Richmond
	{ Craven		{ Bark
	{ Beaufort		{ Green
	{ Carteret		{ Rutherford
	{ Pitt		{ Washington
Halifax, 7 counties.	{ Dobbs	Davidson, 2 counties.	{ Sullivan
	{ Hyde		{ Lincoln
	{ Jones		{ Hawkins
	{ Onslow		{ Davidson
	{ Halifax		{ Sumner
	{ Northampton	N. B. These two are counties in the state of Tennessee.	
	{ Martin		
	{ Edgecombe		
	{ Warren		
	{ Franklin		
	{ Nash		

CAROLINA.

In 1710 the number of inhabitants in this state was computed at 6000; in 1787 at 270,000; in 1791 at 393,751, of whom 100,752 persons were slaves; and in 1805, the number was 478,103, being about $9\frac{1}{2}$ persons to each square mile. Of these 171,648 were white males, 166,116 white females, 133,296 slaves, 7,043 free blacks and mulattoes; and there appears to have been in 10 years an increase of 49,559 whites and 39,793 blacks, &c. or upon the whole of 84,352. The militia of this state consists of 50,000 men. The principal towns of North Carolina are Newbern, the largest, Edenton, Wilmington, Halifax, Hillsborough, and Fayetteville; each of which has, in its turn, been the seat of the general assembly, and the capital of the state. But Raleigh, which is situated in Wake's county, near the centre of the country, (N. lat. $35^{\circ} 56'$ W. long. $79^{\circ} 11'$) has lately been established as the metropolis. The chief rivers of this state are Chowan and its branches, Roanoke, Tar Necks, and Cape Fear, or Clarendon. Most of these, as well as the smaller rivers, have bars at their mouths; and the coast affords no good harbour except Cape Fear. The most remarkable swamps in this country are those in Currituck county and on the line between this state and Virginia. See DISMAL. The most noted sounds are Albemarle, Pamlico, and Core sounds; and the capes are Look-out, Hatteras, and Fear. See their respective names.

North Carolina is, through its whole extent for 60 miles from the sea, a dead level, and the greater part of this space is forest-land, and barren. On the banks of some of the rivers, particularly the Roanoke, the land is fertile and productive; and in the other parts there are interspersed glades of rich swamp, and ridges of oak land, of a black, fruitful soil. Through this whole level country marine productions are found in depths of 18 or 20 feet below the surface of the ground. At the distance of 60 or 80 miles from the sea, the country rises into hills and mountains, as in South Carolina and Georgia, which see. That part of North Carolina which lies W. of the mountains is a tract, about 500 miles long from east to west, and upwards of 100 in breadth, of fine fertile country, watered by the Tennessee, abounding with oaks, several kinds of locust trees, walnut, elm, lime, and cherry trees of large size, some of them being three feet in diameter. See TENNESSEE. Wheat, rye, barley, oats, and flax, thrive in the back hilly country; and Indian corn and pulse of all kinds, in all parts. Cotton and hemp are also cultivated in a considerable degree, and might be raised in greater abundance; the cotton is planted annually; the stalk dying with the frost. One man's labour will produce 1000 pounds in the seeds, or 250 fit for manufacturing. The natural growth of the plains in the low country is almost universally pitch-pine, which may be called the staple commodity of North Carolina, as it affords various articles constituting about one-half of the exports of this state. White and red oak are excellent and abundant; and the swamps furnish cypress and bay trees in great plenty. The most common kinds of timber in the back country are oak, walnut, and pine; and in the moist gravelly soil is a species of oak, called "black jack." The mistletoe is also common; the principal wild fruits are plums, grapes, strawberries, and black-berries. The country also abounds with medicinal plants and roots; such as the ginseng, Virginia snake root, Seneca snake root, and an herb of the emetic kind resembling ipecacuanha. The rich bottoms are overgrown with canes. The produce of the back country, consisting of tobacco, wheat, Indian corn, &c. is chiefly carried to market in South Carolina and Virginia. The southern interior counties carry their produce to Charleston, and the northern to Petersburg

in Virginia. The exports from the lower parts of the state are tar, pitch, turpentine, resin, Indian corn, boards, scantling, slaves, shingles, furs, tobacco, pork, lead, tallow, bees-wax, myrtle-wax, &c. in which articles a trade is carried on chiefly with the West Indies and the northern states. From the latter they receive flour, cheese, cyder, apples, potatoes, iron wares, cabinet wares, hats, and dry goods of all kinds imported from great Britain, France, Holland, &c.; and from the West Indies, rum, sugar, and coffee. The exports in the year ending September the 30th 1791 amounted to 524,548 dollars; but in 1805, those of the domestic produce amounted to 919,545, and of the foreign to 9,142, being in the whole 928,687 dollars.

In the flat country near the sea-coast the inhabitants are subject, in summer and autumn, to intermitting fevers, which are often fatal; but the western hilly parts of the state are as healthy as any parts of the United States. The country is fertile, and full of springs and rivulets of pure water. The air is serene; and though the days are very hot, the nights are cool and refreshing. Autumn is very pleasant, and the winters are generally very mild; upon the whole, many of the inhabitants live to old age. Wheat harvest commences with June, and that of Indian corn is early in September.

The western parts of this state, which have been settled within the last 40 years, are chiefly inhabited by Presbyterians from Pennsylvania, the descendants of emigrants from the north of Ireland, and are very much attached to the doctrines, discipline, and usages of the church of Scotland. They are regular and industrious. Some settlements of Germans, both Lutherans and Calvinists, are interspersed. The Moravians have several flourishing settlements in the upper parts of this state, the principal of which are in Wachovia in the county of Surry, so called after an estate of count Zinzendorf in Austria; and particularly at Salem. The Quakers have a settlement at New Garden, in the county of Guilford, and several congregations at Perguimins and Pasquotank. The Methodists and Baptists are also numerous and increasing. The inhabitants of Wilmington, Newbern, Edenton, and Halifax districts, constituting about three-fifths of the state, once professed themselves of the episcopal church; but many of them, during the progress of the late war between Britain and America, emigrated; and some material changes have since occurred. In December 1789, the general assembly of North Carolina passed a law, incorporating 40 gentlemen, viz five from each district, as trustees of the university of this state, and it has been since liberally endowed. There are also academies at Warenton, Williamsborough, and some others.

As to the habits and manners of the North-Carolinians we may observe, that they are mostly planters, and live at a distance from one another of half a mile to three or four miles, on their respective plantations. Their country is plentiful; but they have little intercourse with strangers; however, they are fond of society and hospitable to travellers. In the lower districts of the country they have very few places for public and weekly worship of any kind, and for want of ministers, these are neglected. The inhabitants of this state appear to have as little taste for the sciences as for religion; and it is remarked, that less attention and respect are paid to the women here than in those parts of the United States where the inhabitants have made greater progress in the arts of civilized life. Temperance and industry are not reckoned among the virtues of this state; and much time is consumed in drinking, idleness, and gaming at cards or dice; and also in cock-fighting and horse-racing. Many of the interludes are filled up with boxing-matches, in which pre-

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vails the brutal practice of "gouging;" a species of diversion, if it may be so called, which is thus performed: "when two boxers are worried with fighting and bruising each other, they come, as it is called, to close quarters, and each endeavours to twist his fore-fingers in the ear-locks of his antagonist. When these are fast clenched, the thumbs are extended each way to the nose, and the eyes gently turned out of their sockets. The victor, for his expertness, receives shouts of applause from the sportive throng, while his poor *eyeless* antagonist is laughed at for his misfortune." This barbarous practice, which we could hardly suppose to have existed, is said to be prevalent among the lower class of people in both the Carolinas, and also in Georgia.

By the constitution of this state, which was ratified in December, 1776, the legislative authority is vested in two distinct branches, viz. a *senate* and *house of commons*, which, convened for business, are styled the *general assembly*. The senate is composed of representatives, one for each county, chosen annually by ballot; and the house of commons consists of representatives chosen in the same manner, two for each county, and one for each of six towns. The qualifications of a senator are one year's residence prior to his election in the county for which he is chosen, and a freehold of 300 acres: and those of a member of the house of commons are the same residence, and a freehold of 100 acres, or such a tenure for the term of his own life. A freeman of 21 years of age, who has been an inhabitant in the state for 12 months immediately preceding the day of election, and who has possessed a freehold of 50 acres within the county for six months next before, and at the day of election, is entitled to a vote for a senator; and all freemen, 21 years of age, who have been inhabitants the year next before the election, and who have paid public taxes, may vote for a member of the house of commons. Judges of the superior court; members of council; judges of admiralty; treasurers; secretaries; attorney generals for the state; clerks of record; clergymen; persons denying the being of a God, the truth of the protestant religion, or the divine authority of the Old or New Testament; receivers of public monies, whose accounts are unsettled; and military officers in actual service, are ineligible to a seat either in the senate or in the house of commons. The senate and house of commons, or general assembly, annually elect by ballot the governor, who must be 30 years of age, a resident five years, and possess a freehold worth 1000*l.*, and who is ineligible to the office for a longer time than three years in six successive years. The assembly also elects seven persons to be a council of state for one year, with whose advice the governor may grant pardons, except for crimes prosecuted by the assembly, fill vacancies in office till the ensuing session, and lay embargoes. The governor is liable to impeachment and prosecution in the supreme court for mal-administration. The salary of the governor is dependent on the legislature. The general assembly appoints the treasurer, the secretary, judges of the supreme courts of law and equity, judges of admiralty, the attorney general, and all the superior military officers, who hold their offices during good behaviour, and are removable by conviction in the supreme court. All bills must also be prepared by the general assembly, and they must be read three times in each house, and be signed by the speakers of both houses, before they pass into laws. Justices of the peace, recommended by the representatives, are commissioned by the governor, and hold their offices during good behaviour. The constitution allows of no religious establishment. The representatives of this state in congress are 12; and the senators are two.

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The history of this state in the earliest period of its settlement is confounded with that of South Carolina, from which it was not separated so as to be erected into a distinct province till the year 1728; and the appropriate particulars of it cannot be accurately ascertained. See the next article. The first permanent settlement in North Carolina seems to have been made about the year 1710, when a number of Palatines from Germany, who had been reduced to very indigent and distressed circumstances by a calamitous war, were conveyed thither. The proprietors of Carolina, hoping to derive advantage from their labour in the cultivation of their lands, resolved to afford every possible encouragement to such emigrants. Accordingly ships were provided for their transportation; and upon their arrival governor Tynte granted them a tract of land in that province, since called Albermarle and Bath precincts, where they settled and hoped to have found an unmolested retreat, though in a kind of wilderness, from the desolations of a war, which then raged in Europe. It was not long, however, before their calamities were renewed by a dangerous conspiracy formed against them in 1712 by the Coree and Tuscorora tribes of Indians. The attack was secret and unexpected; and the massacre of the inhabitants was as general and bloody as it was sudden. Some few escaped the indiscriminate slaughter and gave the alarm; and as soon as the news of the sad disaster had reached the province of South Carolina, governor Craven dispatched a force to their relief. The Tuscororas were defeated; many of them were killed, and others taken prisoners. The remainder of the tribe, having lost about a thousand of their original number, soon after abandoned the country, and joined the five nations, with which they have ever since remained. The infant colony from this time remained in peace, and continued to flourish under the general government of South Carolina, till about the year 1729, when seven of the proprietors accepted 22,500*l.* from the crown, and surrendered its property and jurisdiction. This agreement between the proprietors and the crown was ratified by act of parliament, in 1729; a clause in the act reserving to lord Granville, one of the proprietors, his eighth share, which continued legally vested in his family till the revolution in 1776. Lord Granville's share formed a part of the present state of North Carolina. About the year 1729, the extensive territory belonging to the proprietors was divided into North and South Carolinas; and the limits of the former were ascertained and established by an order of George II. Accordingly they remained separate royal governments till they became independent states.

CAROLINA, *South*, one of the United States of America, bounded on the north by North Carolina, on the east by the Atlantic Ocean, and on the south and south-west by the Savannah river, and a branch of its head water, called Tugulo river, which divides this state from Georgia. The western boundary has not yet been accurately ascertained. It lies between 32° and 35° N. lat., and between 79° and 83° 30' W. long.; extending in length about 200 miles, in breadth 125, and containing 25,000 square miles, of which 2,075,000 acres are improved land. It is divided into nine districts. Charleston, Beaufort, and George-town, constitute what is called the "Lower Country," and contain 19 parishes, and 28,694 white inhabitants; send to the legislature 70 representatives, and 20 senators, and pay taxes to the amount of 28,081*l.* 5*s.* 11*d.* Ninety-six, Washington, Pinckney, Camden, Orangeburg, and Cheraw districts are comprehended in the "Upper Country," and contain 23 counties, and 110,902 white inhabitants;

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send to the legislature 54 representatives, and 17 senators, and pay taxes to the amount of 8,390l. 2s. 3d. See each of the above articles. The inequality of representation is very obvious; and attempts have been made by the upper districts to rectify it. By a late arrangement the name of county is given to the subdivision of those districts only, in which county courts are established. In the lower districts the subdivisions are called parishes and introduced merely for the purpose of electing the members of the legislature of the state. The whole number of inhabitants in 1787 amounted to 180,000; in 1791 to 240,000; in 1805 to 345,591, being about 14 persons to each square mile, and including 100,916 white males, 95,339 white females, 146,151 slaves, and 3,185 free blacks and mulattoes. In 10 years the increase of whites has been 56,077, of blacks, &c. 40,441; so that the whole increase has been 96,518. The militia has consisted of 35,785 persons. The capital of South Carolina is Columbia, seated on the Congaree river, in N. lat. 34° 1'. W. long. 80° 57', and containing 100 houses and 700 inhabitants. Charleston is also a town of note. The only harbours of any note are those of Charleston, Port-royal, and George-town. The islands that border the sea-coast of this state are numerous and convenient; and serve many useful purposes of navigation. The north part of the harbour of Charleston is formed by Bull's, Dewee's, and Sullivan's islands. Opposite to Charleston, on the other side of the harbour, is James' island, which is the residence of about 50 families. Farther south-west is John's island, larger than James's; and these two islands are separated by Stono river, which forms a convenient and safe harbour. Connected with John's island by a bridge is Wadmelaw, having to the east the small isles of Keywaw and Simmon. Between these and Edisto island is North Edisto inlet, which affords a good harbour for small vessels. South of Edisto island is South Edisto inlet through which enter, from the northward, all vessels bound to Beaufort, Asheepoo, Combahee, and Coosaw. On the S.W. side of St. Helena island lies a cluster of islands, one of the largest of which is Port-royal; adjacent to which lie St. Helena, Ladies island, Paris island, and the Hunting islands, being five or six in number and deriving their name from the deer and wild game found upon them. Beyond Broad river is Hilton Head, the most southern sea island in Carolina. West and south west of Hilton Head lie Pinckney's, Bull's, Dawfuskies', and some smaller islands, between which and Hilton Head are Calibogee river and sound, which form the outlet of May and New rivers. The soil on these islands is in general better adapted to the culture of indigo and cotton than the main land; but less adapted to rice. The natural production is the live oak, so excellent for ship-timber, besides the palmetto or cabbage tree so useful in the construction of forts. The principal rivers of this state, which are navigable, are the Savannah, the Edisto, the Santee, and the Pedee, with their branches; which see respectively. Those of a secondary size, being such as occur when you pass from north to south, are Wakkamaw, Black, Cooper, Asheepoo, and Combahee rivers. To the third class we may refer those which extend a short distance from the sea, and by branching off into various creeks serve as drains to the inland swamps, or are merely arms of the sea. The tide flows in no part of the state above 25 miles from the sea. Canals are executed, projected, or begun for connecting Cooper and Santee rivers, and for uniting the Edisto with the Ashley; and it is also proposed to make a waggon-way from the settlements in South Carolina over the mountains to Knoxville, in the state of Tennessee.

This country, with the exception of the high hills of Santee, the Ridge, and some few other hills, is like one extensive plain, till you reach the Tryon and Hog-back mountains, 220 miles N.W. of Charleston. The elevation of these mountains above their base is 3840 feet, and above the sea coast 4640. The mountains west and north-west of these rise much higher, and form a ridge which separates the waters of Tennessee and Santee rivers. The whole state, to the distance of 80 or 100 miles from the sea, is in general low and level, and abounds more or less, especially near the rivers, with swamps or marshes, which are capable of being cleared and cultivated, and which then yield in favourable seasons, an annual income of from 20 to 40 dollars per acre. In the distance above mentioned, the land rises by a gradual ascent from the sea-coast about 190 feet. The traveller, as he proceeds in a W.N.W. course from Charleston, meets with a succession of sand hills, bearing little herbage and a few small pines. The inhabitants are few, and find a scanty subsistence in their corn and potatoes. About 140 miles from Charleston in this direction is the "Ridge" which is a fine high, healthy belt of land, well watered, and with a good soil, and extending from the Savannah to Broad River, in about 6° 30' W. longitude from Philadelphia. Beyond this ridge commences a country exactly resembling the Northern states, Devonshire in England, or Languedoc in France, where hills and dales variously intermixed display their verdure and beauty. Wheat fields are common; and the air is found to be much more temperate and healthful than near the sea. The hills are covered with valuable woods, the vallies are watered with beautiful rivers, and the fertility of the soil is equal to every vegetable production. This is called, by way of distinction, the "Upper Country;" and the inhabitants are actually distinguished by their manners and modes of life, their tones of speaking, and the articles which they cultivate. The land still rises as you advance; and at the distance of 220 miles in a north-west direction from Charleston, the elevation of the land above the sea-coast is found to be 800 feet. Here commences a mountainous country, which continues to the western termination of the state. There are four kinds of soil; *first*, the pine barren, merely valuable for its timber; with interspersed tracts of land producing only grass; these are called "Savannas" and furnish a *second* kind of soil, good for grazing. The *third* kind is that of the swamps and low grounds on the rivers, which is a mixture of black loam and fat clay, producing naturally and in abundance canes, and also cypresses, bays, loblolly pines, &c. The high lands, commonly known by the name of Oak and Hickory lands, constitute the *fourth* kind of soil, which yields oak, hickory, walnut, pine, and locust. On these lands, in the low country, is cultivated principally Indian corn; and in the back country they also raise tobacco in large quantities, wheat, rye, barley, oats, hemp, flax, and cotton. It is, moreover, well ascertained that olives, silk, and madder may be as abundantly produced in South Carolina (and also in Georgia) as in the south of France. There is little fruit in this state: they have indeed oranges which are four, plenty of figs, a few limes and lemons, pomegranates, pears, and peaches; apples are scarce, but melons are raised in perfection. The river and inland swamps, especially those within the reach of the tide, are well adapted to the culture and growth of rice; the swamps above the head of the tide are occasionally planted with corn, cotton, and indigo; the soil is very rich, yielding from 40 to 50 bushels of corn per acre. It is curious to observe, that in the islands near the sea-coast, and for 40 or 50 miles withinland, and on the rivers much farther, the cultivators are all slaves. No white man cultivates a farm without negroes. The articles produced are corn,

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rye, oats, pulse of every kind, potatoes, which, with the small rice, are the food of the negroes; rice, indigo, hemp, and cotton, are for exportation. The plough and harrow are now introduced in the tillage of the land, together with other agricultural improvements. In the middle settlements, the negroes are less numerous; the land is not well adapted to rice; it produces tolerably good indigo weed, and tobacco for exportation; the farmer contents himself with raising corn, potatoes, oats, rye, poultry, and a little wheat. In the upper country, there are few negroes: the plough is almost wholly used; and the farmer depends for subsistence upon his own labour and that of his family. Indian corn, wheat, rye, barley, oats, potatoes, &c. are raised for food; and tobacco, wheat, cotton, hemp, flax, and indigo for exportation. Vines may be cultivated to great advantage; and a great variety of medicinal herbs and roots, as snake root, pink root, ginseng, &c. is furnished in various parts of the state. This country abounds with precious ores, such as gold, silver, lead, black lead, copper, and iron. There are also several pellucid stones of different hues, rock crystal, pyrites, petrified substances, coarse carnelian, beautifully variegated marble, vitreous stone and sand, red and yellow ochres, potter's clay, fuller's earth, chalk, crude alum, sulphur, nitre, and vitriol.

The iron works of this country, called the "Æra Ætna iron-work," are situated in York county, within two miles of the Catawba river. The Æra furnace was built in 1787, and the Ætna in 1788. Mr. W. Hill, one of the proprietors of the works, has contrived, by means of a fall of water, to blow all the fires of the forges and furnaces, so as to render unnecessary the use of wheels, cylinders, or any other kind of bellows. The machinery for this purpose is simple and cheap.

In the middle, and especially in the upper country, the people manufacture their own cotton and woollen cloths, and most of their tools for husbandry; but in the lower country, they depend on being supplied by the merchants.

This state furnishes all materials of the best kind for ship-building. The live oak, and the pitch and yellow pines, are of a superior quality. The indigo manufactured in this country will soon rival that of the French. For the encouragement of emigrants it has been announced that a monied capital may be profitably employed in erecting mills, for making paper, for sawing timber, and especially for manufacturing wheat-flour; in tanning and manufacturing leather, cattle being easily raised and of course hides being very cheap; in making bricks, and in making pot-ash.

The state of education, and, of course, literature, deserves greater encouragement than they have yet found in this state. However, respectable academies have been established in Charleston, Beaufort, Port Royal island, and in other parts of the country. Three colleges have been incorporated by law, one at Charleston, one at Winnsborough, in the district of Camden, and the other at Cambridge, in the district of Ninety-six. Farther improvement in this respect may be reasonably expected, as the legislature in 1795 appointed a committee to consider the best means of establishing schools in the different parts of the state. Since the revolution, all denominations of Christians have been put upon an equal footing, and there have been no disputes between different religious sects. The people are allowed by the constitution to chuse their own ministers, and they are required, when chosen, to subscribe a general declaration expressing their resolution to conform in their public instruction to the scriptures, to be diligent in the exercise of their ministerial functions, and to be attentive to their own conduct. The upper parts of this state are settled chiefly by Presbyterians, Baptists,

and Methodists. The former, including the congregational and independent churches, are the most numerous; the Episcopalians rank next, and are succeeded, with regard to number, by the Baptists, Methodists, &c. The Catabaws are the only nation of Indians in this state; and they have but one town, called *Catabaw*: (which see.) The Creeks and Cherokees, in the west, still retain their names and a portion of their ancient territories on the frontier of the state. The most noted nations among the aborigines of South Carolina were the Stonoes and Westoes, the Sarannees, Apalaches, Congarees, Esares, and Yamassees, in the east and in the centre, who are now either extinct, or mingled with other tribes. On the sea-coast the proportion of slaves far exceeds that of freemen; and the greater part of the white population is found in the western parts of the state. The Carolinians, it is said, sooner arrive at maturity than the natives of colder climates; but though they are distinguished by quickness and vivacity of genius, they are generally destitute of that enterprise and perseverance, which are requisite for the highest attainments in the arts and sciences. As they inhabit a fertile country, cultivated by slaves, and producing plenty, they have few motives to enterprise. Their wealth furnishes them with the means of hospitality, in the use of which they are very liberal. In their manners the Carolinians are easy and affable, as well as polite and attentive to strangers. Although the ladies want the bloom of the north, they have an engaging delicacy in their appearance and manners, and many of them possess the polite and elegant accomplishments. The most fashionable amusement in this state is hunting; gaming of all kinds is more discountenanced among fashionable people in this than in any of the southern states. Twice a year however they have their horse-races. In the conduct of their funerals the people of the richer class are less attentive to propriety than they are on other occasions; as wine, punch, and all kinds of liquors, tea, coffee, cake, &c. are distributed in profusion, when they are assembled to render their last tribute of respect to the dead. The climate varies in different parts of this state. Along the sea coast bilious diseases and fevers of several kinds are prevalent between July and October. These diseases are occasioned by a low, marshy country, which is overflowed for the sake of cultivating rice; but though a residence in or near the swamps is very injurious to health, it has been satisfactorily ascertained, that by merely removing, 3 miles from them, into the pine land which occupies the middle ground between the rivers, the autumnal fevers may be avoided. The upper country, situated in the medium between extreme heat and cold, is as healthful as any part of the United States.

The little attention that is paid to manufactures in this state occasions a great consumption of foreign imported articles; and yet the exports leave a balance in favour of the state, except when there are large importations of negroes. The principal articles exported from this state are rice, indigo, tobacco, skins of various kinds, beef, pork, cotton, pitch, tar, rosin, turpentine, myrtle-wax, lumber, naval stores, cork, leather, pink-root, snake-root, ginseng, &c.; and in the most successful seasons, 140,000 barrels of rice, and 1,300,000 pounds of indigo have been exported in a year. In the year ending Sept. 30, 1791, the amount of exports from this state was 2,693,267 dollars 97 cents.; in the year ending Sept. 1795, 5,998,492 dollars 49 cents.; in 1805, the exports of domestic produce amounted to 5,142,100 dollars, and of foreign ditto to 2,309,516 dollars, or in the whole to 7,451,616 dollars. At this time the shipping of the state comprehends 70,000 tons. The annual expenditure amounts to 173,000 dollars.

By the constitution, framed June 3, 1790, the legislative authority

authority consists of two branches, a "senate" and "house of representatives," styled "General Assembly;" the senators are elected by the people for four years, with a biennial rotation of one-half; and it is required that they be thirty years old, resident five years, and possess a freehold worth £300, if inhabitants of the county where they are elected, or worth £1000, if they live elsewhere: the representatives are chosen for two years; and they must be twenty-one years of age, be resident three years, possess a freehold of five hundred acres and ten negroes, or real estate of £150 value, if they live in the district; but if not resident, a freehold worth £500. The electors must be twenty-one years of age, be resident two years, and possess a freehold of fifty acres, or town lot, or make a payment of a tax of three shillings. With the house of representatives originate money-bills, and they have the power of impeaching officers of state. It belongs to the senate to try impeachments; and conjointly with the other house to appoint commissioners of treasury, secretary, surveyor, and judges. All officers in the judiciary department are appointed by the General Assembly during good behaviour; and receive a stated salary: the sheriffs are appointed for four years. The executive branch consists of a governor and lieutenant-governor; the former, chosen by the legislature for two years, but re-eligible after an interval of four years, with a certain salary, must be thirty years of age, resident ten years, and possess an estate worth 1500 pounds sterling: to him it belongs to remit fines, if not particularly restricted; to reprieve and pardon, except in cases of impeachment; and he is removable, upon conviction of mal-administration, by two thirds of the senate. The lieutenant-governor is elected at the same periods, with the same qualifications. This state has eight representatives in congress, and two senators.

The first settlement in Carolina seems to have been made during the troubles in France, subsequent to the reformation; when Jasper de Coligni, a principal commander of the protestant army, fitted out two ships, and sent them with a colony to America, under the command of Jean Ribaud, for the purpose of securing a retreat from persecution. Ribaud landed at that point which is now called Albemarle river, in North Carolina. This colony endured incredible hardships and was extirpated by the Spaniards. Towards the latter end of the reign of Queen Elizabeth, Sir Walter Raleigh made some unfortunate attempts to fix colonies in Carolina; and in 1608 Carolina, which had been formerly called Carolana, and also Georgia, were thought very proper for propagating silk, wine, pot-ashes, cochineal, &c. In 1629 king Charles I. made a grant to his attorney-general, Sir Robert Heath, and to his heirs, of the country called Carolana, including N. and S. Carolina, Georgia, &c.; and Sir Robert afterwards conveyed this province to the earl of Arundel, who was at the expence of planting several parts of it. But no permanent settlement seems to have been made in Carolina, till after the restoration of king Charles II., when this king granted by his first charter, dated March the 24th, 1662—1663, to Edward earl of Clarendon, then lord high chancellor of England, and seven others, all lands lying between the 31st and 36th degrees of North latitude, and extending westerly as far as the South Seas; and in 1665 a second charter was granted to the same persons, enlarging their boundaries as far as 29° N. lat. towards the south, and 36° 30' N. lat. towards the north. Of this extensive territory, the king constituted lord Clarendon and the other seven persons absolute lords-proprietors, and invested them with all the necessary powers for plant-

ing and governing it. The proprietors engaged the famous Mr. Locke to frame for them a constitution and body of laws, which consisted of 120 articles. The settlement, however, was not completed till the year 1669, when Colonel William Sayle, being appointed first governor of this country, embarked with a colony, and settled in the neck of land where Charleston now stands. During the proprietary government, which lasted 50 years (reckoning from 1669 to 1719), the colony was harassed with perpetual dissensions, attacked by the Indians, by pirates, and by the French and Spanish fleets, and embroiled by internal quarrels, partly with their governors, and partly on account of religion between the episcopalians and dissenters; the proprietary government was found ineffectual; and a revolution taking place about the year 1719, the government became regal. In 1728 the proprietors, with the exception of lord Granville, surrendered their property and jurisdiction to the crown for the sum of £22,500 sterling; and at this time the constitution was new modelled; and the territory, limited by the original charter, was divided into North and South Carolinas. From this period the colony began to flourish; and between the years 1763 and 1775, the number of inhabitants was more than doubled. During the contest for independence, this state was for three years the seat of war, suffered much, and lost many of its best citizens. Since the peace it has availed itself of its agricultural and commercial advantages, and the abilities of its most distinguished characters, and promises in process of time to become one of the richest in the union. A dispute having arisen and long continued about the boundary line, separating the two states of South Carolina and Georgia, commissioners were appointed, in April 1787, by the contending states, for the purpose of adjusting the controverted boundary, and it was fixed as follows: the most northern branch or stream of the river Savannah, from the sea or mouth of such stream, to the fork or confluence of the rivers now called Tugulo and Keowee, and from thence the most northern branch or stream of the said river Tugulo till it intersects the northern boundary line of South Carolina, if the said branch of Tugulo extends so far north, reserving all the islands in the said rivers Savannah and Tugulo to Georgia—but if the said branch or stream of Tugulo does not extend to the north boundary line of South Carolina, then a west line to the Mississippi, to be drawn from the head spring or source of the said branch of Tugulo river, which extends to the highest northern latitude, shall for ever hereafter form the separation limit and boundary between the states of South Carolina and Georgia." Morfe's Geog. and Gazetteer. Anderson's Commerce. Mod. Un. Hist. vol. xxxvi. Sketch of the Geog. and present State of the united territories of N. America, &c. Philad. 1805.

CAROLINA, LA, a town of Spain, and the capital of new settlements in the Sierra Morena; founded by D. Pablo de Olavide, a native of Peru; 20 miles N.E. of Andujar. The soil about Carolina consists chiefly of sand; and the rock is either limestone or gypsum. They produce olives, oil, wine, silk, wheat, barley, rye, oats, peas, Indian wheat, and lentils. They have no manufactures, for the profitable employment of the people; and, consequently, these new settlements swarm with half naked beggars.

CAROLINE, is a silver coin of Sweden, worth about 1s. 2d. with the legend *fi Deus pro nobis quis contra*. See also CARLIN.

CAROLINE, is also a name given to the four books composed by order of Charlemagne, to refute the second council of Nice, with regard to the worship of images. They contain one hundred and twenty heads of accusation against that council,

council, drawn up by the bishops of France, and first published in 1549, by M. du Tillet, bishop of Meaux, under the title of *Elia Phylira*.

CAROLINE, in *Geography*, a county of North America in Virginia, situate on the south side of Rappahannock river, which separates it from King George's county. It is about 40 miles square, and contains 17,489 inhabitants, including 10,292 slaves.—Also a town in this county; 6 miles S. of Port-royal.

CAROLINE, a county on the eastern shore of Maryland, bordering on Delaware state to the East and containing 9506 inhabitants, including 2057 slaves. Its chief town is Danton.

CAROLINE *Islands*, or, as they are sometimes called, the *New Philippines*, form the most extensive range of islands in the Pacific Ocean, and comprehend those that lie between about 138° and 165° E. longitude; and about 10° N. lat. This chain of islands appears to have been discovered by the Spaniards in 1686, and to have derived its name from the Spanish monarch Charles II. They are about 30 in number, and very populous, except three, that were uninhabited. The natives resemble those of the Philippines, and chiefly live upon fish and cocoa-nuts; nor does their language seem to be very different. Each isle, it is said, has its respective chief to whom it is subject, and all of them respect a monarch whose residence is at Lamurue. They believe in certain celestial spirits, and think they descend to bathe in a sacred lake in Fallalo; but they have neither temples nor idols, nor any appearance of worship. Their dead are sometimes thrown into the sea, and others are interred, the grave being surrounded with a stone wall. The inhabitants of Yap, it is said, worship a kind of crocodile, and have their magicians. Polygamy is allowed, and the Tamul, or chief of the large isle of Hogoleu had nine wives. Criminals are banished from one isle to another. These islanders do not appear to have any instruments of music, but their dances are accompanied with songs. Their only weapons are lances, armed with bone. Negro slaves are not unknown in this remote region; and in one or two of the islands the breed is said to be mingled: 29 Spaniards having been left on one of these islands, who are supposed to have married and settled. But their principal population seems to have been derived from the migrations of the fairer race from the Philippine islands, and farther eastward; and these were most probably occasioned by stress of weather, which drove their canoes from island to island, and from one group to another, that had not been before peopled. The people of Ulea are reported to be more civilized than the rest, and much to resemble those of the Pelews. The most considerable of the Carolines is Hogoleu, about 90 British miles in length and 40 in breadth. Next to this, but not above a third part of its size, is Yap, in the western extremity of the range. Some few small groups of islands have been discovered in the eastern extremities of this chain, which may be properly classed under the same denomination. In 1733, Cantova, a Jesuit missionary, was massacred with eight Spaniards in the isle of Mogmog. A particular chart of these islands has been constructed after that of this Jesuit, and the relations of other missionaries, which have been printed as a supplement to the "*Histoire des Navigations aux Terres Australes*," by De Brosfles. See vol. ii. See also the Preliminary Discourse to the Missionary Voyage, p. 86.

CAROLINE *Waters and Baths*. See CARLSBAD.

CAROLINEA, in *Botany*, (in honour of Sophia Carolina, marchioness of Baden, a liberal patroness of botany) Linn. Jun. Supp. p. 51. Schreb. 1125. Willd. 1282. (Pa-

chira, Aubl. 291. Juss. p. 279. Paclitier, Savigny in Encyc.) Class and order, *monadelphia polyandria*. Nat. ord. *Columniferae*, Linn. *Malvaceae*, Juss.

Gen. Ch. *Cal.* simple, one leaved, bell-shaped, very short, truncate, obscurely five-furrowed, slightly emarginate between each furrow, so as to appear somewhat five-toothed, surrounded by five globular bodies at its base. *Cor.* petals five, very long, sword-shaped, nearly erect, concave, rather acute, reflexed at the tip, inserted into the base of the calyx, thick, caducous. *Stam.* filaments about 300, shorter than the petals, united in their lower half into a tube, which incloses the germ, divided about the middle into from 10 to 15 distinct bundles, which in their upper part are again divided into about as many capillary filaments; these filaments are sometimes single, but are most commonly bifid more than half way down, each division bearing an anther; anthers upright, oblong, a little recurved. *Pist.* germ superior, furrowed; style filiform, the length of the stamens; stigmas five, lanceolate, acute. *Peric.* capsule very large, egg-shaped, coriaceous, furrowed, one-celled, opening at the summit with numerous valves. *Seeds* numerous, angular, thick, lying one upon another.

Obf. The younger Linnæus attributes to his plant an inferior germ, and a two-celled pome, with twin seeds in each cell, whence Jussien and Savigny have expressed a doubt whether it be the same with that of Aubley; but as he expressly quotes Aubley's figure, it seems most probable that his description is in these respects erroneous.

Eff. Ch. *Calyx* simple, bell-shaped. *Petals* five, very long. *Stamens* very numerous, monadelphous at their base. *Style* one. *Stigmas* five. *Capsule* egg-shaped, furrowed, one-celled, many-valved, many-seeded. Savig.

Sp. 1. *C. princeps*, Linn. Jun. Sup. p. 314. Mart. Willd. Swartz. Prod. 101. (*Pachira aquatica*, Aub. Guian. tab. 291, 292. Cavan. Diff. 3. tab. 72. fig. 1. Lam. Illust. Pl. 589.) "Leaves generally quinate; leaflets ovate-lanceolate." A large tree. *Trunk* much branched, from 15 to 20 feet high, 2 feet in diameter; bark ash-coloured; wood soft and spongy; branches spreading widely. *Leaves* digitate; common petiole six or seven inches long, with two stipules at the base; leaflets from three to five, acute, almost sessile, smooth, green, very entire, unequal in size, the middle one often more than seven inches long. *Flowers* superb, more than a foot long, axillary, solitary; peduncles thick and very short; petals yellow, caducous; filaments reddish; anthers purple. *Fruit* resembling that of the cacao (*theobroma*), and thence called in Cayenne the wild cacao. The seeds are eatable, but as they are very flatulent when taken raw, they are most commonly roasted. A native of marshy ground in Guiana. 2. *C. insignis*, Mart. Willd. Swartz. (*Bombax grandiflorum*, Cavan. Diff. 5. p. 295. tab. 154. *Fromager grandiflore*, Lam. Encyc. Xiloxochitl. Hernand Mex. 63. with a figure.) See *BOMBAX grandiflorum*. The flowers of this species are so similar to those of the preceding, that Swartz seems to be justified in removing it from *Bombax*, under which it was formerly placed; but Savigny observes, that as he is not acquainted with the fruit, he does not absolutely pronounce it either a *Bombax* or a *Carolinea*, though he is most inclined to the latter.

CARLOSTADT, or CARLOSTADT, ANDREW BODENSTEIN, in *Biography*, an eminent Lutheran divine, was a native of Carlostadt, or Carlstadt in Franconia, and having studied in Germany and Italy, he became canon, archdeacon, and theological professor at Wittemberg. When Luther took his degree of doctor in this university, in 1512, Carlostadt was dean; and as soon as the former began to preach

preach against popery, the latter joined him and became his colleague. His temper, however, was ardent, and not a little inclined to enthusiasm; and, determined to extend the reformation, he took the opportunity of Luther's absence, in 1522, for this purpose, and excited a tumult at Wittemberg, by the suppression of private masses, the removal of images out of the churches, and the abolition of the law which imposed celibacy upon the clergy. In these measures, though Mosheim charges him with imprudence and precipitance, he acted in conjunction with Bugenhagius, Melancthon, Amsdorff, and others; and they were confirmed by the authority of the elector of Saxony. Luther, probably disapproving some of these innovations, and displeased at their having been adopted without his authority, broke with Carolostadt on his return. Upon this the latter immediately retired to Orlamund; and attacking the opinion of Luther concerning the eucharist, widened the breach between them. Carolostadt rejecting the absurd and unintelligible consecration of Luther, represented this ordinance as a commemoration of Christ's death, and not as a celebration of his bodily presence; and in order to evade the difficulty attending the expression, "This is my body," he alleged, that Christ pointed to his own body, when he made this declaration, and not to the bread. Carolostadt was the first Protestant divine who took a wife; and against this part of his conduct Luther could have had no objection, as he imitated his example. His fanaticism, however, was a just ground of complaint; for, though he did not adopt the most censurable opinions of Munzer and his anabaptist associates, and of those enthusiastic teachers, who pretended to a divine inspiration, he nevertheless inclined to favour them, and was actually chargeable with some extravagancies that were observable in their tenets and conduct. Accordingly he was an advocate for the abolition of the civil law, with the municipal laws and constitutions of the German empire, and he proposed substituting the law of Moses in their place. He also distinguished himself by railing at the academies, declaiming against human learning, and other follies. Having thus incurred the displeasure of Luther, he was commanded to leave the electorate of Saxony; and he repaired to Switzerland, where he successfully propagated his doctrines, first at Zurich, and afterwards at Basil; probably without that attachment to fanaticism, which had given offence; because, after his banishment from Saxony, he composed a treatise against enthusiasm in general, and against the extravagant tenets and violent proceedings of the anabaptists in particular. This treatise was addressed to Luther, and produced such an effect on the mind of this reformer, that he pleaded the cause of the exile, and obtained from the elector a permission for him to return to Saxony. After this reconciliation with Luther, he composed a treatise on the eucharist, which breathes the most amiable spirit of moderation and humility; and, having perused the writings of Zuingli, in which his own sentiments on that subject are maintained with the greatest perspicuity and force of evidence, he repaired, a second time to Zurich, and from thence to Basil, where he was admitted to the offices of pastor and professor of divinity, and where, after having lived in the exemplary and constant practice of every Christian virtue, he died with the warmest effusions of piety and resignation, on the 25th of December, 1541. Nevertheless, his memory has been very unwarrantably reproached, and his character calumniated, by Moreri, Bossuet, and Roman Catholic writers. Mosh. Eccl. Hist. by MacLaine, vol. iv.

CAROLOSTADIANS, or **CARLOSTADIANS**, in *Ecclesiastical History*, an ancient sect, or branch of Lutherans, who denied the real presence of Christ in the eucharist, so denominated from their leader Carolostadius. See the pre-

ceding article. The Carolostadians are the same with what are otherwise denominated **SACRAMENTARIANS**, and agree in most things with the **ZUINGLIANS**.

CARLOSTADT, in *Geography*. See **CARLSTADT**.

CAROLUS, an ancient English broad piece of gold, struck under king Charles I. whose image and name it bears. Its value has been estimated at twenty-three shillings sterling; though at the time when it was coined, it is said to have been only rated at twenty shillings.

CAROLUS is used for a small copper French coin, mixt with a little proportion of silver, first struck by Charles VIII. of France, whence it took its name; being, at the time when it ceased to be current, valued at six *deniers*.

CAROLY, or **CURUTE**, in *Geography*, one of the Laccadive islands in the Indian Sea, off the coast of Malabar. N. lat. $10^{\circ} 32'$. E. long. $72^{\circ} 35'$.

CAROMB, a town of France, in the country of Vennaisin; 5 miles from Carpentras.

CARO-MOELLI, in *Botany*, Rheed. Mal. See **SINEROSYLLON**.

CARON, in *Geography*, a town of Persia, in the province of Farsistan; 75 miles S. of Susa.

CARONCULE, in *Ornithology*, the French name of the wattled starling, *Sturnus carunculatus*.

CARONI, in *Geography*, a river of Dutch Guiana, or Surinam, which rises N. of the lake Parimia, and flows into the Orinoco.

CARONIA, a town of Sicily, on the N. coast, in the valley of Demona, on a river of the same name; 5 miles N.E. of Mistretta.

CAROPELLA, a river of Italy, which runs into the gulf of Manfredonia, near Rioli.

CAROPI, in *Botany*, a name given by the inhabitants of the Philippine islands to a plant more usually known among authors by the name of **TUGUS**, greatly esteemed by the natives, and supposed by Camelli to be the true *anomum* of the Greeks, so much valued in those ancient times.

CAROPOLIS, in *Ancient Geography*, a town of Asia Minor, in Caria. Steph. Byz.

CARORA, in *Geography*, a town of Terra Firma, in North America, about 110 miles N.E. from Gibraltar, on Maracaybo lake.

CAROTEEL, in *Matters of Commerce*, denotes a certain weight or quantity of divers kinds of goods, ex. gr. of cloves, from four to five hundred weight; of currants, from five to nine hundred weight; of mace, about three hundred weight; and of nutmegs, from six to seven and an half hundred weight.

CAROTIC is used by some writers to denote those who are seized with the **CARUS**.

CAROTID, in *Anatomy*, from *καρρω*, to lay asleep; a name given to the large arteries which supply the head, from a mistaken notion that tying these vessels would induce sleep. There are two common *carotid arteries*, a right and left; of which the former is a branch of the *arteria innominata*, the latter arises from the arch of the aorta. Each of these vessels is again divided into an *external* and an *internal carotid artery*. For the description of these vessels, see **ARTERY**.

CAROTID canal, is a winding passage in the petrous portion of the temporal bone, through which pass the internal carotid artery, and the branches of the *nervus motor externus*, and of the vidian nerve, which join the superior cervical ganglion of the great sympathetic nerve. See **SKELETON**.

CAROTID foramen, is the opening of the carotid canal on the surface of the basis crani. See **SKELETON**.

CAROTO, GIOVANNI FRANCESCO, in *Biography*, a painter of history and portrait, was born at Verona in 1470, and

and having learned the principles of his art from Liberale Veronese, removed to Mantua and became a disciple of Andrea Mantegna. Under his instruction, he acquired a readiness in design and freedom of hand, which rendered him often superior to his master; and many of his compositions were taken for those of Andrea. In order to confute those who attempted to degrade him by asserting that he was incapable of painting in a large size, because he had principally delighted in small figures, he finished a noble design in the chapel of the Virgin at Verona, with figures as large as life; and thus established his reputation. He died in 1546. His brother, whom he had instructed, designed all the curious remains of antiquity in and near Verona, and particularly the amphitheatre, afterwards engraved and published. He was a good architect, and is said to have given lessons to Paolo Veronese. Pilkington.

CAROUGE, in *Botany*, see CERATOMIA *Siliqua*.

CAROUGE, in *Geography*, a town in the department of Leman, and chief place of a canton, in the district of Genève; the place contains 3250, and the canton 8,322, inhabitants: the territory includes 90 kilometres and 10 communes.

CAROUGE *Point*, the northernmost extremity of the island of St. Domingo, in the West Indies; 25 miles N. from the town of St. Jago.

CAROUGE of Buffon, in *Ornithology*, the Bonana bird of English writers, ORIOLUS *Bonana*.

CAROUGES, or CARROUGES, in *Geography*, a town of France, in the department of the Orne, and chief place of a canton, in the district of Alençon; 4 leagues N.W. of Alençon. The place contains 1950, and the canton 15,130 inhabitants; the territory comprehends 300 kilometres and 25 communes.

CAROVIGNO, a town of Naples, in the province of Otranto; 3 miles E. of Ostuni.

CAROUZE, a cape on the north coast of the island of St. Domingo. N. lat. 19° 59'. W. long. 70° 53'.

CAROXYLON, in *Botany*, Thumb. Jussieu, Lam. See SALSOLA *aphylla*.

CARP, in *Ichthyology*. See CYPRINUS.—Common Carp. See CYPRINUS *Carpis*.

CARP, golden. *Cyprinus Auratus*, Gold Fish. See AURATUS CYPRINUS.

CARP-meals, a coarse kind of cloth, made in the northern parts of England.

CARP stone, lapis *carpionis*, a kind of gem said to be found in the fauces, by others in the back-bone, of the *carp* fish, about the size of a pea, of a triangular figure, and white colour without, but yellow within. It is supposed to be of use against the stone, and ebullitions of the bile, being taken in powder, or held in the mouth.

CARPACK, in the *Egyptian Dress*, a sort of red cap turned up with fur, which some make a custom of wearing in common, though it is properly a part of the dress of the interpreters only, the same cap with muslin tied round it being more properly the common dress.

CARPACK, in *Geography*. See CARPATES.

CARPÆA, from *Καρπαία*, a kind of dance or military exercise, in use among the Cœnians and Magnesiens, performed by two persons; the one acting a labourer, the other a robber. The labourer, laying by his arms, goes to sowing and ploughing, still looking warily about him as if afraid of being surprised: the robber at length appears, and the labourer quitting his plough, betakes himself to his arms, and fights in defence of his oxen. The whole was performed to the sound of flutes and in cadence. Sometimes the robber was overcome and sometimes the labourer; the victor's

reward being the oxen and plough. The design of this exercise was, to teach and accustom the peasants to defend themselves against the attack of ruffians.

CARPAL LIGAMENT, or *ligamentum carpi proprium*, in *Anatomy*, is a strong ligament under which the flexor tendons of the fingers, and the median nerve, enter the palm of the hand. See LIGAMENTS.

CARPAS, in *Geography*, a town near the eastern point of the island of Cyprus, in the Mediterranean. It was anciently called *Carpasia*, by Pliny *Carpasium*, and by others *Carpessus*.

CARPASLÆ, in *Ancient Geography*, small islands, situate very near to the isle of Cyprus, and north of it, almost opposite to the town of Carpalia.

CARPASIUM *linum*. See LINUM *Carpasium*.

CARPASUM, or CARPASIUM, in the *Materia Medica* of the ancients, the name of a poisonous gum, exuding from a tree, so like myrrh in appearance that many perished by the error of using it instead of myrrh, or mixed among it. We are at this time wholly ignorant of its nature; but that it was a gum exuding from a tree, is plain from the account of Dioscorides, who calls it *opocarpasum*, as we do the flowing balm of Gilead, *opobalsamum*. The wood of the tree which produced it, he calls *xylocarpasum*, in the same manner as the other wood is called *xylobalsamum*. This wood was little less poisonous than the carpasum, or gum itself. Galen tells us that the carpasum was like myrrh of the very purest and finest kind; and that those people who were most curious of all to have fine myrrh, often met with the carpasum among it, and gave death, instead of relief, to the persons to whom they administered it. We find, by the words of Galen, that this gum was not only like myrrh, but was also brought from the same places, and was often mixed with it. The finest myrrh usually had most of this poison among it, and we may collect from the same account that it was a sweet-scented gum, for otherwise no body could have mistaken it for myrrh. Galen de Med. Simpl. lib. vii.

CARPATES, in *Ancient Geography*, the name given to a long chain of mountains, which terminated European Sarmatia on the southern side; now called mount Carpack.

CARPATHIAN MOUNTAINS, in *Geography*, a grand and extensive chain, which bounds Hungary on the north and east, and which are called by the Germans the mountains of "Krapak," probably the original name, but softened by the Roman enunciation. The Hungarians call them "Tatra." This enormous ridge extends in a semicircular form from the mountain of Javernick south of Silesia towards the north-west. But at the mountain of Trojeska, the most northern summit, it bends to the south-east, to the confines of the Buckovina, where it sends forth two branches, one to the east and another to the west of Transylvania; which is also divided from Walachia by a branch running south-west and north-east. The whole circuit may be about 500 miles. Dr. Townson (see his Travels in Hungary, 4to. 1796), visited these Hungarian Alps from the vicinity of Kefmark, first proceeding to the "Green See," a lake amidst the mountains, passing through forests of firs and delayed in his progress by the thick branches of a tree resembling the pine, called "Krumholz," which were succeeded by rocks of limestone and granite. He computes that the Kefmark peak, which towards Hungary is a perpendicular rock, may be about 8508 feet above the level of the sea. The Lomitz peak, to which he next proceeded, is, as he says, the highest of the whole Carpathian chain, and placed towards its centre; but he afterwards expresses a doubt, whether it be not rivalled, if not exceeded, by the Krivan, situated more towards the west, 20° 45' of E. long. from London. He attained

attained the summit of Lomnitz with some difficulty, and computed it to be 8640 feet above the level of the sea, or not much above half the height of M. Blanc, or M. Rosa. He found it composed of grey granite like the rocks at the bottom; but with a small mixture of a greenish black, earthy substance; nevertheless, the vegetation consisted of little except a few lichens. These peaks are seldom visited except by the hunters of the chamois, and some idle adventurers, who search for gold and precious stones. The marmot also appeared; but our intelligent traveller denies that the ibex, or rock goat of the Swiss Alps, is found in the Carpathian heights. The Krivan he afterwards ascended with more ease, but found it inferior in height to the Lomnitz, being 8343 feet above the sea. It is probable that summits of greater elevation arise in the eastern part of the chain; but there are no glaciers nor other tokens of the eternal winter of great altitude.

Dr. Townson gives us a curious account of a Carpathian "Koschar," and its inhabitants. This is a small wooden hut in the midst of a wood, built in the Swedish manner; that is, with balks, whose ends are let into one another, something in the manner of what carpenters call dove-tail work; it was only about six yards long, and three broad; and divided into two apartments, but by no means weather-tight. In the first apartment the head-shepherd, who is only a poor common peasant, lives, and makes the cheese; the other is the magazine, where it is kept till it is sent to Kefmark, which is every week. The business of the dairy is very simple: the sheep are driven home thrice a day to be milked; and each milking is immediately made into cheese, for they make no butter. The rennet is poured upon the milk while it is warm, which is soon after beaten together, and presently the head-shepherd gropes together with both his hands all the curds. This business appeared to be difficult, and lasted near half an hour: the curds then form one great mass, and are taken out together, put into a cloth, and hung up; but no pressure is used. The whey which remains is boiled, and acquires some consistence, and this forms the food of the shepherds, and their only food for the whole season; they have not even bread. After the shepherd and his men had eaten their supper, the men, of whom there are four or five, left the hut, and went to sleep under sheds around the fold. In the night the head-shepherd got up two or three times and hollowed to his men, to ascertain whether they were upon the watch; and they always answered, to satisfy him that they were attentive to their duty. Great vigilance is requisite against the wolves, and with all their precautions these animals had carried off their sheep this summer.

The Carpathian ridge occasionally branches towards the north and south; in the former direction the most remarkable are the hills on the west of Silesia, those which adjoin to the salt mines of Wieliczka, a few miles south-east from Cracow in Poland, and those which extend through part of Bukovina. Toward the south a branch stretches from the centre of the chain towards Tokay; and there are other branches not accurately defined, which descend in the same direction from the eastern circuit. Pinkerton's Mod. Geog. vol. i.

CARPATHIAN Sea, a part of the Mediterranean Sea, to the south-west of the isle of Rhodes, between this and the island of Candia. It derives its name from Carpathos, an island whose coasts it bathes. This sea has acquired celebrity from having been mentioned by Horace, Ovid, Propertius, and Juvenal.

CARPATHOS, or CARPATHUS, in *Ancient Geography*, now *Scarpanto*, an island of the Mediterranean Sea, situate

between the isle of Crete or Candia, to the south-west, and the isle of Rhodes to the north-east. Strabo says that it contained four towns, one of which was called Nisyros; Scylax assigns it only three, and Ptolemy one, called Posidium. It was long and strait, and, according to Scylax, 100 stadia in length from nearly the south to the north. Strabo says, that its circuit was 200 stadia. This island was anciently inhabited by some soldiers of Minos, the first of the Greeks who possessed the empire of the sea. Many generations after his time, Jolcos, the son of Demoleon, an Argian, planted here a colony. Homer calls it Crapathos. It was also called Tetrapolis, from its four towns, Heptapolis, from its seven towns, and Pallenia, after the son of Titan, the first possessor of this island.

CARPATHOS, a town in the above island, which was a metropolitan see.

CARPATHOS, in *Geography*, a town of South America, in the country of Peru, and jurisdiction of Guamates; most of the inhabitants are weavers, and employed in manufacturing bays, serges, and other stuffs.

CARPE DE MER, in *Ichthyology*, the name by which the common wrasse, *labrus tinca*, is known in some of the maritime parts of France; called also *labre vielle*.

CARPELLA, in *Ancient Geography*, a promontory of Asia, placed by Ptolemy in Carmania, very near to the promontory Armosum, in the Persian gulf, and S.W. of it.

CARPENTANOS MONTES, in *Geography*, a chain of Spanish mountains, extending from near Soria on the N.E. and pursuing a S.W. direction towards Portugal. This chain is also called that of Urbia, or Guadarama.

CARPENTARIA, a large bay on the northern coast of New Holland, discovered in the year 1618. S. lat. 10° 20'. E. long. 130° 50'.

CARPENTER, an artificer, whose business is to cut, fashion, and join timber and other wood for the purposes of building. The word is formed from the French *charpentier*, which signifies the same, formed of *charpente*, which denotes timber; or rather from the Latin *carpentarius*, a maker of *carpenta*, or carriages.

CARPENTER, in *Ornithology*, a name given in St. Domingo to a species of wood-pecker, probably the green wood-pecker, or *picus viridis*, which it resembles in its colour, form, note, and habits; because it hollows and injures trees, particularly the plum trees, which it sometimes bores through, and the cocoa-tree. The inhabitants of Cayenne give the name "Yellow Carpenter" to the yellow wood-pecker, the *picus exalbidus* of Gmelin, the *picus Cayanensis albus* of Brisson, and *picus flavicans* of Latham.

CARPENTER'S Work, in *Architecture*, includes the framing, flooring, roofing; the foundation, carcase, doors, windows, &c. In the mensuration of this kind of work, large and plain articles are usually measured by the square foot or yard, &c.; but enriched mouldings and some other articles are often estimated by running or lineal measure, and some things are rated by the piece. In measuring of *joists*, it should be recollected, that only one of their dimensions is the same with that of the floor; and the other will exceed the length of the room by the thickness of the wall, and $\frac{1}{2}$ of the same, because each end is let into the wall about $\frac{3}{4}$ of its thickness. No deductions are made for hearths, on account of the additional trouble and waste of materials. *Partitions* are measured from wall to wall for one dimension, and from floor to floor, as far as they extend, for the other; nor is any deduction made for door-ways, on account of the trouble of framing them. The *measure of centering for cellars* is found by means of a string made to pass over the surface of the arch for the breadth, and taking the length of the cellar for the

the length; but in groin-centering, it is usual to allow double measure, on account of their extraordinary trouble. In *roofing*, the length of the house in the inside, together with $\frac{2}{3}$ of the thickness of one gable, is to be considered as the length; and the breadth is equal to double the length of a string which is stretched from the ridge down the rafter, and along the eaves board, till it meets with the top of the wall. For *slair-cases*, take the breadth of all the steps, by making a line ply close over them, from the top to the bottom, and multiply the length of this line by the length of a step for the whole area. By the length of a step is meant the length of the front, and the returns at the two ends; and by the breadth is to be understood the girt of its two upper surfaces, or the tread and riser. For the *balustrade*, take the whole length of the upper part of the hand-rail, and girt over its end till it meet the top of the newel-post, for the length; and twice the length of the baluster upon the landing, with the girt of the hand-rail, for the breadth. For *quain-scotting*, take the compass of the room for the length; and the height from the floor to the ceiling, making the string ply close into all the mouldings, for the breadth. Out of this must be made deductions for windows, doors, chimneys, &c.; but workmanship is counted for the whole, on account of the extraordinary trouble. For *doors*, it is usual to allow for their thickness, by adding it to both the dimensions of length and breadth, and then multiply them together for the area. If the door be pannelled on both sides, take double its measure for the workmanship; but if one side only be pannelled, take the area and its half for the workmanship. For the *surrounding architrave*, girt it about the outermost part for its length; and measure over it, as far as it can be seen when the door is open, for the breadth. *Window shutters, bases, &c.* are measured in the same manner. In the measuring by roofing for workmanship alone, all holes for chimney-shafts and skylights are generally deducted. But in measuring for work and materials, they commonly measure in all skylights, luthern-lights, and holes for the chimney-shafts, on account of their trouble and waste of materials. Artificers measure flooring, partitioning, roofing, tiling, &c. by the square of 100 feet. See MEASURE and CARPENTRY.

CARPENTERS, *Company of*. See COMPANY.

CARPENTER'S *Joint rule*. See RULE.

CARPENTER, *Ship*, a person employed in the docks, in the construction and repairing of vessels.

CARPENTER *of a ship*, is an officer at sea, whose business is to have things in readiness for keeping the vessels in repair; and to attend the stopping of leaks, fising of masts or yards, also caulking, careening, breaming, and the like. He is to watch the timber of the vessel that it does not rot, consult frequently with other officers on the state of the masts, yards, &c. and in time of battle he is to have plugs, tompons, and planks ready, for repairing breaches made by the enemy's cannon.

The carpenter has a mate under him, and a crew or gang to command on necessary occasions.

CARPENTORACE MINORUM, in *Ancient Geography*, now *Carpentras*, a town of Gallia Narbonnensis, N.E. of Avenio, seated upon an eminence near the river Ausonius. It was known to Pliny, who reckoned it among the Latin cities; and the Romans fixed in it a colony, probably in the time of Julius Cæsar. It belonged to the Memmicians, and had a triumphal arch, which is supposed to have been erected in commemoration of the victory obtained by Cn. Domitius Enobarbus over the Allobroges and Anvernates, near the confluence of the Sorgue and the Rhone, about $2\frac{1}{2}$ leagues from this city.

CARPENTRAS, in *Geography*, an ancient town of Vol. VI.

France, in the county of Venaissin, on the river Auson, or chief place of a district, in the department of Vaucluse. It was, before the revolution, the see of a bishop, and still exhibits many vestiges of Roman magnificence. The north part of it contains 4,784, and the south 3,705 inhabitants: the north canton has 9,300, and the south 11,146 inhabitants. The extent of its territory comprehends 200 kilometres, and 8 communes, 5 in the northern, and 3 in the southern part. It is distant 12 miles N.E. from Avignon. N. lat. $44^{\circ} 4'$. E. long. $5^{\circ} 6'$.

CARPENTRY, in *Civil Architecture*. The art of carpentry is, in general terms, the art of employing timber in the construction of edifices. This is an art of the most general and important use, and of the highest antiquity; from the rude and solitary cabin to the rich and peopled city, in the earliest dawns and the brightest periods of civilization, wherever nature has presented to man her forests, the building art has found in them a material of universal application, commodious and economical. Carpentry is also interesting to the fine arts, as its forms and operations have been the model of Grecian architecture, which has decorated and improved, but never renounced, its original type in wooden building. See the articles BUILDING and CIVIL ARCHITECTURE.

With respect to the history of this art our information is short and scanty. Pliny and Vitruvius, the only writers upon the building arts whose works have reached modern times, confine their observations upon carpentry chiefly to the choice and felling of timber; and it may be readily conceived that ancient buildings preserve no specimens of an art which is not calculated to resist the injuries of time and the violences of rapine.

The remains of Egyptian architecture present, perhaps, the only example of a complete system of building without the use of timber, while, at the same time, arches and vaults were unknown; for many Roman edifices, such as the Pantheon, Temple of Peace, &c. might be quoted, which, by means of vaults, are independent of carpentry. In the Egyptian construction, however, flat roofs of massy stone were used, which it was necessary to support by thick-set avenues of columns, arranged at small equal distances over the whole area. This form, though sufficiently striking and picturesque, was of course inconvenient, and only adapted to a dry climate. A pediment roof, therefore, was the first effort of constructive carpentry; this answered the purpose of an effectual shelter, by throwing off the humidity of the skies; at the same time, the rafters, in connexion with the transverse beams of the ceiling, formed a truss which would be gradually improved, and thus give the means of covering a wide space, without any other support than the external walls.

The invention of pediment roofs leads us naturally to Greece, where this member was an essential part of architecture. Besides forming roofs, the Greeks appear to have used carpentry in the framing of floors, and for rustic buildings and other purposes. But in a warm climate, abounding with stone and marble, it is not probable, that wood was much used in the internal finishing of any edifices, except for those objects wherein lightness and tenacity are essential qualities, as doors; though there are some remains of marble doors. Museum Worlesyanum.

This was less the case in Rome. The Romans seem to have used wood for nearly all the purposes of carpentry that the moderns are acquainted with. The roofs of buildings, the architraves, where they were very long, as in the Tuscan temples and other cases, the framing of floors, were all of this material. They also formed arches of slight timber grating

for stuccoing; they had wooden cornices, and the stone seats of theatres were covered with boarding. Vitruvius, l. 4. l. 7. &c. Wealforesaid of considerable buildings, as amphitheatres, being erected of wood; such was that built by Augustus to exhibit the shows on account of the victory of Actium, and many others, at Rome and different parts of Italy. It may be remarked that the beams of the roof were generally left uncovered by a ceiling; and sometimes, in magnificent buildings, encrusted with bronze, and even gilded as in the basilica of St. Peter, erected by Constantine.

In the colder countries of Europe, wood was more plentifully used, particularly in the interior works; and in the middle ages the art of carpentry partook of the bold and skilful construction exhibited in that style of building commonly called gothic; of this the high pitched weighty roofs and lofty spires of the great cathedrals afford many striking instances.

In more modern times carpentry still improved. The wooden bridges of Palladio are examples of admirable construction. Some French artists too have given eminent instances of ingenious carpentry, as Philibert Delorme in his method of constructing wooden domes; and Molineau in his, which was executed at the Halle du Bled, at Paris, and various centres for large stone arches by Perronet, Hupeau, &c. In England the timber work of the dome and scaffolding of St. Paul's, and, in later times, many examples of centres, bridges and roofs may be cited as models of scientific carpentry; while in accuracy of execution, celerity and neatness of finishing, our workmen are unequalled. In the north of Europe, and particularly in Sweden and Norway, wood is almost the only material used for building; and of course the natives must have considerable practical skill in carpentry.

The art of employing timber in building is divided into two grand branches: carpentry and joinery. The first includes the larger and rougher kinds of work, and that part which is material to the construction and stability of an edifice; and, generally, all the work wherein the timber is valued by the cubical foot. Joinery, which is called by the French, menuiserie, from the menus bois, or small wood employed in that art, includes all the interior finishing and ornamental wood-work, and is valued by the superficial foot.

In this article we shall treat of the constructive part, or carpentry, strictly speaking, leaving what respects the material and belongs to architecture in general, as the choice of trees, the strength of timber, &c. to the article TIMBER. We shall therefore suppose the material arrived in the carpenter's yard, and in the state of whole or squared timber. The operations it undergoes from this period to its final employment in a building may be classed under two general heads, those which relate to individual pieces, and those which relate to their connexion with others. Under the first head are the operations of the pit saw, too generally known to need description, by which the whole timber is divided and reduced to the required *scantlings*; this term, from the French, *echantillon*, means dimensions, relative to breadth and thickness without respecting length:—Planing, which is giving a smooth face to wood by means of a familiar instrument called a plane, consisting of a chisel fixed in a frame, serving as a handle, by which the workman moves it along over the surface of the timber, shaving off its inequalities: timber thus prepared is said to be wrought:—Mouldings of various forms, and performed with particular planes or chisels:—Rebating, which consists in diminishing the width of a square, or rectangular piece of timber, for a certain depth on one edge, thus taking off a rectangle of the whole width, and less than the depth of the original piece; this

method is particularly used in door-cases, and the frames of casement windows, the *rebate* forming a kind of ledge for the door or casement to stop against:—Grooving or plowing, in which a narrow channel is excavated out of the thickness of the timber: the groove is either square, forming an equal section in the whole depth, or wider at bottom than at top, which is called a *dovetail* groove. Timber may also be *sunk* where the piece is formed like a wedge, or rounded; or *bevelled* in various shapes, which means when the section forms a figure without right angles.

We now come to the second and most important head of the operations by which timbers are connected together. These are generally speaking, by *mortise* and *tenon*, the first an excavation, and the second a projection, adapted to it; or by wooden pins or nails, spikes, screws, bolts, straps, and other fastenings of metal, or by glue, though this last is scarcely used except in joinery.

The following is a description of the most general and useful methods of joining timbers. First, by simple tenon and mortise, as when joists are framed into trimmers, the most usual method is to make the tenons in the middle of the breadth of the trimmer with a plain shoulder; see *fig. 1. Plate LXII. of Architecture*, which represents a section of the trimmer, and a part of the joist, framed in a longitudinal direction. But when binding-joists are framed into girders, as the binding-joist has to support the bridging-joists, and these the floor, the best method, in order to give strength to the tenon, is to make a rest of a short length under the tenon, with a sloping shoulder above, extending in a line from the extremity of the rest to the perpendicular of the square shoulder below at the upper edge of the binding-joist. See *fig. 2. Plate LXII. of Architecture*. No. 1. represents a section of the girder through the mortises; Nos. 2 and 3 part of the joists in a longitudinal direction.

When a piece of timber is to be framed between two parallel pieces which are quite immovable, the true method, in order to make close work, is to make the extremity of the tenon and the bottom of the mortise, at one end, in the arch of a circle, having its centre in one edge of the mortise, and the extremity of the tenon, and the bottom of the mortise at the other end, in a concentric arch from the same centre. As the mortise at this end must be much longer than the breadth of the tenon, there will be a large part of the mortise still open, which may afterwards be filled up. Instead of the bottom of the mortise here being formed in the arch of a circle, it may be cut quite parallel to the edge to the deepest part, as it will not impede the transverse piece in going to its place. This mode of framing is much used in ceiling, joisting for double floors: the long mortises cut in this manner are called *chase* mortises. In forming the tenon and mortise, at the end where the centre is placed, it is not necessary that the mortise and tenon should be so deep as to form an entire quadrant; in this case the bottom may be quite parallel, and only the further edge opposite the centre made circular. *Fig. 3. Plate LXII. of Architecture* represents a piece of framing, in the manner above described, A B, the bottom of the mortise, and the extremity of the tenon described from the centre C; D E the running, or chased mortise, which must be quite free from the circumference described by the point D, whether the extremity be in the circumference, or in a tangent, D F, parallel to G E.

The manner of representing the tenon and mortise at the end on which the centre is placed, when the mortise is made of a less depth than the breadth of the tenon, is shewn at the other end.

When a transverse piece is to be framed between two parallel

parallel joists, of which their vertical surfaces are oblique to each other, the upper edge of the transverse piece is turned downwards upon the top of the joists, and marked at the interval or clear; it is then turned upwards into the position in which it is to be placed, the mark at one end is brought into a right line with the vertical surface of the joist, and a line is drawn by the edge of a rule or straight edge placed vertically in the plane of the joist and the transverse piece; this line marks the shoulder of the tenon. The other end is drawn in the same manner. This mode of framing a transverse joist between two parallel joists is called by workmen tumbling-in-joists. The manner of tumbling in a joist is exhibited at *fig. 4. Plate LXII. of Architecture*. A and B are sections of the parallel joists, C D E F the transverse joist, or the piece tumbled in, G H the straight edge placed for drawing the shoulder C F.

A piece of timber may be joined at right angles to another in the manner of *fig. 3. Plate LXI. of Architecture*, which is a longitudinal section in the direction of the fibres of both pieces. A mortise is cut in the one piece to the breadth of the piece which is to form the perpendicular: the edge of the tenon is cut with a dove-tail notch, so that the piece may be at right angles to the other, and a wedge or key is driven from the other edge of the tenon, which forces it quite close. One inconvenience arising from the dove-tail is, that if the timber of which it is made be not quite dry, the tenon will shrink in proportion to its breadth, and therefore the perpendicular piece will be liable to be drawn to a certain degree. To remedy this defect, instead of the edge of the tenon being cut dove-tail ways, it may be notched, as is to be seen in *fig. 4. No. 1.* No. 2. shews another view of the perpendicular piece with the wedge.

Another method of fixing one piece of timber perpendicular to another, is to mortise the piece forming the base not quite through, enlarging the edges towards the bottom, and making the tenon of the perpendicular piece to fit the upper part of the mortise. Two wedges are then fixed to the bottom of the tenon; where the perpendicular piece is driven, the wedges will be refitted by the bottom, which will split the ends of the tenon, and fill up the mortise to the breadth at the widest place. This mode of fixing one piece at right angles to another is called fox-tail wedging. By this method, so long as the wedges are kept from slipping, the one piece can never be drawn from the other, without breaking the tenon. In order to enlarge the tenon in breadth still more towards its extremity, two other smaller wedges may be put in, of which their ends do not reach quite so far as those of the other two, which, when partly driven, the small wedges will then begin to widen the end of the tenon likewise, and make it fill the mortise completely at the bottom. *Fig. 5. No. 1.* shews the edge of the piece on which the mortise is cut. Fox-tail wedging is chiefly used where the pieces to be put together are small, and then the wedges are frequently driven in with glue; when the pieces to be joined are large, the former method is generally practised.

The fixing beams to wall-plates is called cocking or cogging. When a beam is to connect two wall-plates, in order to bind the sides of the building together, one method is to cut the end of the beam in the form of a dove-tail, and to make a corresponding notch in the wall-plate to receive it, as is shewn in *fig. 6. No. 1.* No. 2. is a transverse section at the neck of the dove-tail. *Fig. 7.* shews the same thing, with a small variation in the form of the dove-tail, fitted obliquely to the other piece. But when the timber has not been sufficiently seasoned, and when it begins to dry, the perpendicular piece may easily be drawn from the other, to a certain degree. Therefore, if the sides of the building are affected

by lateral pressure, this mode of fixing the one piece to the other will not prevent the walls from coming nearer together, or expanding. The most effectual method of preventing this is shewn at *fig. 8. No. 1.* where a small notch is cut out of the beam, and the contrary parts, viz. a double notch, cut in the wall-plate to receive it. No. 1. the beam shewn longitudinally upon a transverse section of the wall-plate; No. 2. the upper face of the wall-plate. The best method of connecting any number of posts with cross-beams depends upon this principle. *Fig. 9. No. 1.* shews a transverse section of a post with two beams longitudinally bolted to it, in the manner of cogging beams to wall-plates: No. 2. a part of one of the beams, shewing the notches. The strongest method of fixing the purlins of a roof to the rafters also depends upon the same principle. *Fig. 10. No. 1.* is a section of the rafter, with the purlin longitudinally drawn; No. 2. the upper edge of the rafter; No. 3. the under side of the purlin, shewing the notch.

The method of joining timber laterally, by means of keys and dove-tails, is ingenious, and not generally known: it will be necessary to exhibit and describe the manner of doing it. *Fig. 1. Plate LXI. of Architecture*, No. 1. is a longitudinal section of two pieces joined in this manner, with the dove-tail pieces and the wedge or key, by means of which they are forced against the ends of the pieces to be fixed, and in order to make the one press harder to the other, the interior angle of the dove-tails is greater than the exterior one, formed upon the pieces to be joined; No. 2. is a transverse view of the mortise, exhibiting the ends of the dove-tails and keys. *Fig. 2.* is the same method, applied in joining parallel pieces not touching each other together, which is plain to inspection.

The modes in which beams are lengthened are of infinite variety; some of the most approved forms are as follow. A beam may be continued to any extension by building it in three thicknesses; see *fig. 1. Plate LX. of Architecture*. It may also be done by splicing one to the end of another, called by carpenters scarfing, which is of various forms, as in *figures 1, 2, 3, 4, 5, 6, 7, and 8.* When a beam is to be lengthened, as in *fig. 2. and 3.* it is very difficult to get the joints close when the pieces composing it are very large, and hence they are seldom used but for very small pieces, which may be glued together. To remedy this inconvenience in large works, as well as to make it less dependent on the bolts; and to prevent every possibility of the one being drawn away from the other, is to indent them together, called tabling, as in *figures 4, 5, 6, 7, 8, and 9,* and to leave a small space at the end or meeting of each table for a wedge. In the operation of joining timbers in this manner, the pieces are laid so as to bring the joint as close as possible, the wedge is then driven while another person strikes the extremity of one of the pieces with a large hammer or mallet, which will bring the joint quite close, if they have been well fitted together previously to the operation; of these two forms, *figures 5, 6, and 7* ought to have the preference, as the faces of the tables are parallel to the fibres of the wood, which will make them resist any longitudinal strain with a much greater force; but as a disadvantage arises from this form, that more than half the wood is cut quite through at the two ends of the joints, it has been found necessary to fix plates of iron across them, as are shewn. However, there is less to be apprehended from the tearing of the fibres, by being drawn in a direction of their length, than from the bending of the bolts.

Fig. 6. is a scarf with several tablings; in this it is to be observed, that the wedges in the two extreme mortises are only effective. A wedge in the middle would tend to force the joints open, and therefore the other two should only be

fixed. Long scarfings add to the strength; but to increase the number of tables more than two, is, it is thought, rather disadvantageous, as it shortens its fibres, and consequently makes their resistance less. *Fig. 7.* is an excellent method of scarfing in two pieces, each piece being tabled together, as in *fig. 5.* It has been thought by some that tabling scarfings lessen the section of resistance more than is necessary; and for this purpose they prefer *fig. 8.* with an oblique scarf, where the keys are let half into the one and half into the other: but in this mode, as a draught must be left for the keys, they will be apt to be turned round in the driving, and therefore will have less effect in keeping the pieces together. *Fig. 9.* is a mode of scarfing a beam by tabling the pieces together; No. 1. and 2. are the two halves; when bolted together they have the appearance of being quite straight, as is shewn in No. 6. The tables are made in the form of obtuse angles, with a ridge in the middle, depressed and raised alternately, in the form of re-entering and salient angles; No. 3. section across the depressed part; No. 4. section across the raised part; No. 5. section of the beam when bolted together. In all forms of scarfing whatever, every butting joint should be strapped across with iron on both sides; this will in a great degree prevent the bolts from being bent, and will increase the longitudinal resistance at the weakest section. If a beam is to be scarfed and tabled as in this last mode, the utmost care ought to be taken in the workmanship, so that all the butting-places ought to be closely fitted together.

Connected with scarfing is the method of joining timbers, which may either be endways, sideways, perpendicularly, or obliquely. When two pieces of timber are so joined that the common seam or joint is perpendicular to the fibres of both pieces, then the joint is said to be butting, and is called by workmen a butting or heading joint. When two pieces of timber are joined together, so that the common seam is parallel to the fibres of both pieces, this then may be called lateral or longitudinal joining, and the joint may be called a longitudinal joint, as it runs in the direction of the grain; and when the fibres and seam of the one piece run perpendicular to the fibres of the other, this mode of joining timbers may then be called transverse joining, and the joint may be called a transverse or perpendicular joint. Lastly, when the fibres of the one piece run obliquely to those of the other, this is called oblique joining, and the joint is called an oblique joint.

Butting joints for many purposes are preferable to scarfings, particularly in small work, such as the hand-rails of stairs.

They are fixed together with bolts, having a screwed nut at each end, the head of one of these nuts must be quite round and the other square; the round one must be cut in its circumference full of notches. After having let in the bolt perpendicularly to the joint in both pieces, the nuts are sunk from one side across the grain, until the ends of the bolt may be able to pass the interior screw made on purpose to receive the exterior one; the square nut is first put in and the one end of the bolt is firmly driven into the bore made on purpose to receive it, and screwed to the nut. The other notched nut is then put in, and the bolt in its place; the one piece may be turned round upon the other until the joint is close, but in order to secure the joint from turning round, two dowels may be inserted on each side of the bolt. Drive the one piece as close to the other as the nut will permit. Then by means of a narrow pointed screw-driver and mallet, the nut may be turned round until the joint is quite close.

Fig. 1. Plate LXII. of *Architecture* represents the meeting

of a pair of rafters and the king-post, together with the manner of strapping them. This mode of forming a junction by making the rafters meet each other, without the intervention of the joggle head, which is generally made to the king-post, has the advantage over the common mode with a joggle-head, exhibited in *fig. 6.* Plate LXII. of *Architecture*, as the shrinking of the king-post at the joggle will allow the roof to descend, and consequently put it out of shape.

One method of strapping the tie-beam to the king-post is exhibited at *fig. 7.* Plate LXII. of *Architecture*. The mortise of the strap on both sides is made oblong, and that through the king-post is made somewhat lower, in order to give the wedges a proper draught. An idea may be formed by examining No. 1. which represents the bottom of the king-post with part of the tie-beam; No. 2. is a longitudinal section of the king-post, with a transverse section of the beam, in the upper part of this is shewn the manner of fixing the wedges, with the form of the washers, which are necessary in preventing the strap on each side from penetrating into the wood, the whole force of the friction being taken away from the straps by them. Another mode of fixing the tie-beam to the king-post is by a bolt, as exhibited at *fig. 8.* Plate LXII. of *Architecture*. No. 1. shews the elevation of the bottom of the king-post; No. 2. is a vertical section cutting the beam transversely; in order to give greater security, there are two nuts, one let in from the face of the beam and the other from the edge. *Fig. 1.* Plate LXIII. of *Architecture* shews the meeting of a brace and straining-piece under a truss beam, as the brace may be resolved into two forces, one pushing in a direction of the beam, that is, compressing the straining piece, and the other tending to break it transversely, the end of the brace is cut in the form of a Sally, or bird's mouth, as it is called by workmen. Another method is shewn at *fig. 2.* Plate LXIII. of *Architecture*. This mode is used in the roof of Greenwich chapel. See the figures in the article ROOF. It may, however, be observed, that this abutment is not of the best kind; the space left for the brace to give pressure to the straining-piece is much too small; the upper part should not be let into the straining or truss-beam, this prevents the straining piece from acting with its full force, and weakens the truss-beam.

Fig. 3. Plate LXIII. of *Architecture* shews the method of securing a collar-beam, at one extremity, to its adjacent rafter, in order to prevent its being pulled away at the joint, a bolt is made to pass through the rafter at the angle of their meeting.

Besides what has already been shewn of the hanging of king-posts to their principal rafters, *fig. 4.* Plate LXIII. of *Architecture* is another. The rafters meet each other as in *fig. 5.* Plate LXII. of *Architecture*, but instead of the forked strap, a bolt is here used, with a spreading head, so as to form a shoulder at right angles to the rafters, which are notched, in order to receive the bolt. This also prevents the rafters of a roof from sinking in the middle. Instead of any part being of wood, the whole may be of iron, consisting of two parts, connected together by means of a screw, which will draw the tie-beam higher and higher at pleasure as it is turned round. No. 1. part of the king-post with the bolt; Nos. 2. and 3. part of the rafters; No. 4. view of the upper edge of the rafters. Various forms are sometimes adopted for the abutments at the bottom of the king-post; for the braces, when the king-post is not sufficiently broad at the bottom, as to allow the abutting shoulder to be at right angles to the length of the brace, and to its whole breadth. Two of the most approved forms are exhibited in *figures 5* and *6.* Plate LXIII. of *Architecture*. *Fig. 5.* shews the form of the abutment, when the part which makes the resistance

C A R P E N T R Y.

in the direction of the king-post is at right angles to it. *Fig. 6.* shews the form of the abutment, when the part of the shoulders which makes the resistance is at right angles to the brace; this mode is better than the former, because it is less liable to compress the king-post at the bottom.

Fig. 7. Plate LXIII. of Architecture represents one form of the heel of a principal rafter, with the socket cut in the end of the tie-beam to receive it; but as the small part cut across the fibres of the beam is so near to the extremity, and as this part sustains the whole force of the rafters, in drawing the beam in a direction of its length, it will be liable to be forced away. To prevent this in some measure, a double resistance is formed, as in *fig. 8. Plate LXIII. of Architecture*, equally deep into the beam; this mode gives the strength of the intermediate part contained between the two abutments, in addition to the end resistance, which is of itself equally strong with that represented in *fig. 7.* The intermediate part in this mode being cut across the fibres, it is easily split away. A more effectual method of forming a double resistance is shewn at *fig. 9. Plate LXIII. of Architecture*, where the heel of the rafter and the socket is cut parallel to the fibres of the beam; the tenon forms the second abutment, being removed farther from the extremity. No. 1. the elevation of part of the rafter with part of the beam; No. 2. the upper edge of the beam, shewing the mortise. But the most effectual mode of forming a resistance on the heel of the rafter and socket on the extremity of the beam is that represented by *fig. 10. Plate LXIII. of Architecture*, where the abutment is brought nearer to the inner part of the heel, which leaves a greater length on the end of the beam, in order that the resistance may still be greater than what is given by the wood. A strap may be placed round the extremity of the rafter, and the two ends bolted together through the beam, as is shewn by this diagram at No. 1. and 2.

Fig. 11. Plate LXIII. Architecture represents two braces of a roof meeting an iron king-post, which is only a small rod of iron sufficiently strong to hang up the middle of the beam, and to receive the force of the braces by the weight of the middle rafters. The strap which prevents the braces from being pushed downwards, has an eye through each side, and the bottom of the king-rod is formed with a cross equal in length to the thickness of the braces; this cross is perforated in its length to receive the bolt.

The purposes for which wood is employed in modern buildings, and particularly in those of England, are very various. It is used to form the frame work of the roof, and in laths or boarding, to support the covering of tiles, slates, &c. Long pieces, called *bond* or *chain* timber, are laid in the walls to strengthen and bind them together: other flat pieces, called *plates* or *wall plates*, are placed to receive the ends of the girders, joists, and other timbers, which form the framing of the floors, and afford them a level bed. *Ties* are placed across the building to assist in keeping the opposite walls in their situation, and counteract the lateral pressure of the roof, and diagonal ties at the angles. *Lintels* are laid over the apertures of doors or windows to support the incumbent walls. The floors are framed with various beams and joists. The rooms are divided with *quarter partitions*, being a frame work of small posts and horizontal and diagonal pieces placed at about a foot asunder, and destined to be cased with lath and plaster on the outside. Door and window-frames are also placed in the apertures of the walls. In bad foundations piles are sometimes used; and sometimes planking, and what are called *sleepers*, pieces of timber, laid at short intervals transversely, beneath the foundation wall, and extending about two feet wider: besides all the finishing wood work, such as doors, windows, wainscoting, &c.

which belongs to joinery. Carpentry is also employed to construct the centres for arching and vaulting, and frequently in entire bridges. Cofferdams, caissons, flood-gates, and all the methods of building in water, derive large assistance from this art.

The general principles of measuring and valuing carpenter's work may be given very shortly; and to enter into minutiae would be superfluous in the present work. The timber used for building in London, and in the greatest part of England, consists entirely of oak and fir; the first the growth of this country, the second imported chiefly from Norway. That timber which is out of sight, as being covered with lath and plaster or other facing at the completion of the building, which is by much the greater part, is used as it comes from the saw, without the operations of the plane. Of this, part is framed as the roof, floors, partitions. The quantity is measured by the cubic foot, and either valued as *fir framed*; or else the quantity of timber being ascertained, is put down as fir without labour, (*fir no labour*) in the valuation of which is included the original price of the timber, with the expence of cartage, sawing, waste, and the profit to the carpenter; and a superficial dimension is taken of the frame or space in which the timber was employed under the denomination of *labour* and *nails*, to a floor of such a kind, roof, quarter partition, &c. in which is estimated the value of the workmanship, with the master's profit. The choice between these two methods is influenced by custom, and the convenience of the measurer. The timber used in the walls, as the plates, and bond timber, is measured separately by the cubic foot, and put down under the denomination of *fir in bond*: this is valued at a medium price between *fir framed*, and *fir without labour*. As for the timber which remains apparent after the completion of the building, it is generally worked in some manner with the plane, and is measured by the cubic foot, and denominated and valued according to the workmanship; thus a doorcase is *framed, wrought, rebated, and beaded*. We have mentioned only fir because it is infinitely more used than oak, however the latter is measured in the same way.

Boarding, such as weather-boarding, boarding for slates, &c. is measured by the superficial foot, and valued in the bill by the square, or 100 superficial feet. Timber used in very small scantlings, as fillets, is valued, not by the cubic or superficial foot, but by the foot in length, called foot run.

Having thus described what is properly included under the general head of carpentry, the reader is referred, for more particular information, to the articles CENTRE, FLOOR, and ROOF; under which articles that part of constructive carpentry which depends on certain branches of mechanics and geometry will be fully explained.

CARPENTUM, in *Antiquity*, a denomination common to divers sorts of vehicles, answering to coaches as well as waggons, or even carts among us: sometimes on two and sometimes on four wheels; and sometimes covered, and at other times uncovered.

The carpentum was originally a kind of carr or vehicle wherein the Roman ladies were carried; though in after-times it was also used in war. The form of this carriage may be seen on antique coins, where it is represented as a two-wheeled carr, with an arched covering, and it was sometimes hung with costly cloth. It was a later invention than the *leſſica*, and the *arcera* mentioned in the 12 tables, which was a covered carriage used by sick and infirm persons.

Some derive the word carpentum a *carro*; others from *Carmenta*, mother of Evander, by a conversion of the *m* into *p*, *carpentum* for *carmentum*. Thus Ovid, Fast. lib. i.

“ Nam.

"Nam prius Aufonias matres Carpentia vehebant

Hæc quoque ab Evandri dicta parente reor."

CARPENZANO, in *Geography*, a town of Naples, in the province of Calabria Citra; 10 miles S. of Cosenza.

CARPERA, in *Ichthyology*, a name given by Cuba, and some other writers on fishes, to the common carp, cyprinus carpio.

CARPESIA, in the *Materia Medica of the Ancients*, a name given to a kind of spice, or aromatic drug, often mentioned by Ægineta and others, and made an ingredient in cordial and stomachic medicines. This was a vegetable substance, being the top shoots of young twigs of an odiferous shrub, growing in Pamphylia, and smelling very like the finest cinnamon.

As the ancients used both this drug and cubebs, it is certain that had they both been the produce of the same tree, they must have known it; and this it is plain they did not know, for they have nowhere named any such thing; but, on the contrary, they have expressly said, that the *carpesia* was the shoots of a tall tree, which produced no fruit. Avicenna gives also this account, and adds, that it grew, in his time, on mount Lebanon, and that the part gathered for this use was certain twigs, very long, cylindric, and but little thicker than a needle, which had a very fragrant smell.

CARPESIMUM, in *Botany*, (Καρπυσιον, Galen.) Linn. gen. 948. Schreb. 1284. Willd. 1478. Juss. p. 184. (Conyzoides; Tourn.) Class and order, *syngenesia polygamia superflua*. Nat. Ord. *Composita discoidæa*, Linn. *Corymbifera* Juss.

Gen. Char. *Cal.* common, imbricated; outer scales larger, spreading, reflexed; inner ones equal, close, shorter. *Cor.* compound, equal; florets hermaphrodite in the disk, funnel-shaped; border five-cleft, spreading; female in the circumference, tubular, five-cleft, converging. *Stamens* filaments five, short. *Pist.* similar in both kinds of florets; germ oblong; style simple; stigma bifid. *Seeds* inversely egg-shaped, naked. *Recept.* naked.

Eff. Char. *Receptacle* naked. *Down* none. *Calyx* imbricated; outer scales reflexed.

Sp. 1. *C. cernuum*, Linn. Sp. Pl. Jac. Aust. tab. 204. Lam. Illust. Pl. 696. fig. 1. (After cernuus; Colum. Ecphr. 1. tab. 252. Barrel. ic. 1142. Conyzoides flore flavescens; Tourn. Chrysanthemum conyzoides, Morif. hist. 3. tab. 5. fig. 26.) "Flowers terminal, solitary, nodding." Willd. *Root* perennial, Willd. *Lam.* biennial, Mil. *Stem* a foot and half high, branched, leafy, cylindrical, villous. *Leaves* alternate, oval-lanceolate, slightly serrated, narrowing at their base, clothed with short hairs. *Flowers* yellowish; peduncle thicker at the top, with four or five unequal, lanceolate bractes situated at the base of the calyx. A native of moist ground in Italy, Switzerland and Provence. 2. *C. abrotanoides*, Linn. Sp. Pl. Osbeck it. tab. 10. Lam. Illust. 696. fig. 2. "Flowers axillary, generally solitary." *Root* perennial. *Stem* branched, rather hard. *Leaves* alternate, broad-lanceolate, slightly crenate, lessening into a petiole, about the length of a finger. *Flowers* sessile, or on very short peduncles, about the size of a hazel nut, nodding; calyx umbilicated, surrounded by spreading leaflets; florets numerous; seeds oblong, naked, smooth, smeared with a kind of balsam. A native of China.

CARPESIMUM, in *Ancient Geography*, a mountain of Asia, in Pamphylia.

CARPESTRIERA, in *Geography*, a river of Italy, which runs into the sea; 9 miles E. of St. Severino.

CARPET, a sort of covering, worked either with the needle, or on a loom; to be spread on a table, trunk, an estrade, a passage, or a floor.

Persian and Turkey carpets are those most prized; especially the former, for which there is a manufacture at Paris: carpets that had a hair or shag on one side only, were called by the ancients *tapetes*; such as had a shag on both sides, were called *amphitapetes*. English *carpets*, especially those of AXMINSTER, (which see) and those, the manufacture of which was established in London by the late Mr. Moore, are much valued. For a further account of this manufacture, see TAPESTRY.

Among *Jockeys*, to *shave the carpet*, is to GALLOP very close, or near the ground; a fault foreigners charge on English horses.

Figuratively, an affair, proposal, &c. are said to be brought on the *carpet*, or tapis, when they are under consideration, &c.

CARPET-knights, a denomination given to gown-men, and others, of peaceable professions, who, on account of their birth, office, or merits to the public, or the like, are, by the prince, raised to the dignity of knighthood.

They take the appellation *carpet*, because they usually receive their honours from the king's hands in the court, kneeling on a carpet. By which they are distinguished from knights created in the camp, or field of battle, on account of their military prowess.

Carpet-knights possess a medium between those called *trucks*, or *dunghill-knights*, who only purchase, or merit the honour by their wealth; and *knights bachelors*, who are created for their services in the war.

CARPET-way, in *Agriculture*, a term applied to a green plat or path left unploughed up in an arable field; or, in common fields, to such strips as serve for divisions.

CARPETANI, in *Ancient Geography*, a people of Hispania Citerior, situate on the W. towards Lusitania. Their principal towns were Complutum, Contrebia, Mantua, and Toletum. Ptolemy assigns to them 18 towns.

CARPETANIA, a country of Spain, in which Pliny places the towns of Contrebia and Hippona; and where this author, and also Ptolemy, place Oebura. The mountains of Carpetania are denominated by Pliny "Carpetana juga;" and he says that the chief town was Contrebia.

CARPHALEA, in *Botany*, (from Καρφαλιος, dry.) Lam. Illust. 155. Pl. 59. Juss. p. 198. Class and order, *tetrandria monogynia*, Linn. Nat. Ord. *Rubiaceæ*, Juss.

Gen. Ch. *Cal.* superior, four-leaved; leaflets ovate, veined, scarious, permanent: *Cor.* funnel-shaped; tube long, slender, swelling near the top, hairy within; border four-cleft; lobes acute. *Stam.* Filaments four, very short, inserted within the tube; anthers linear, erect. *Pist.* Germ. inferior; style bristle-shaped, longer than the corolla; stigma bifid. *Peric.* Capsule crowned with the calyx, two-celled, two-valved, many-seeded; partition opposite to the valves, splitting into two. *Seeds* unknown. Effent. Ch. *Calyx* superior, four-leaved, scarious. *Corolla* tubular. *Capsule* crowned with the calyx, two-celled, many-seeded.

Sp. *C. Madagascariensis*. "Leaves opposite, linear-lanceolate; flowers in a corymbus." An arid shrub, with leaves like those of hyssop, and terminal flowers in a dense corymbus or rather cyme. In La Marck's figure the younger branches are leafy, the older ones naked; and one of the younger branches there represented has a single pair of opposite leaves near the top, and three sets of six or seven in a whorl below; the other has five pair of opposite leaves, and appears rough near the bottom with the scars of the fallen whorls. Found by Comerfon in the island of Madagascar. Jussieu observes that it has the habit of *Serissa* and the calyx of *Petræa*.

CARPI, UGO DA, in *Biography*, flourished in 1500, and

and was less celebrated as a painter than in other respects. The Italians have ascribed to him the honour of having been the first engraver on wood; but though this be not true, his claim to the invention of that species of engraving on wood, distinguished by the name of *chiaro-scuro*, in imitation of drawing, appears to be better founded. For this purpose he cut the outlines on one block of wood; the dark shadows upon a second; and the light shadows or half tint upon a third. The first being impressed upon the paper, the outlines only appeared: this block being removed, the second was put in its place, and being also impressed upon the paper, the dark shadows were added to the outlines; and the third block being put in the same place, upon the removal of the second, and also impressed upon the same paper, made the demi tints; and the print was completed. In some few instances the number of blocks was increased, and being applied in the same manner, the print received an impression from every block. His prints, though slight, are usually very spirited, and wrought in a very masterly style. Out of the great number which he engraved, we shall mention the following: viz. "A Sibyl reading in a book, with an infant holding a flambeau to light her;" "The burning of Troy, with Æneas saving his father Anchises;" "A descent from the cross;" "David cutting off the head of Goliath;" all from Raphael; and a "Magician seated on the ground, with a book open before him, and in the back-ground a bird with its feathers plucked off," from Parmigiano. This species of engraving was carried to great perfection by Andrea Andriani, (see his article,) and also by Balthasar Peruzzi of Siena, and Parmigiano. Strutt. Pilkington.

CARPI, GIROLANO DA, a painter of portrait and history, was born at Ferrara in 1501, and studying under Garofalo, had become the best artist among his disciples. He afterwards studied the works of Correggio; and for this purpose spent several years at Parma, Modena, and other cities of Italy, where the best of his works are preserved. Such was his success in the imitation of this eminent master's style, that many paintings, copied by Carpi from his pictures, were taken for originals, and eagerly purchased by connoisseurs. It is presumed that at this day several of the paintings of Carpi pass for the genuine productions of Correggio. He died in 1556. Pilkington.

CARPI, in *Ancient Geography*, a people of Valeria, according to Ammianus Marcellinus, transplanted by Dioclesian into Lower Pannonia, and placed in the vicinity of the Ister. The mountains called "Carpates," were probably the first habitation of this people, who abandoned it under the empire of Alexander.

CARPI, a town of Proconsular Africa, according to Pliny, called Carpis by Ptolemy, and placed by him one third of a degree more northerly than Carthage; to this city pertained an episcopal see, noticed in the conference at Carthage. Dr. Shaw (Travels p. 87.) supposes the spot which this town occupies to be that which "Gurbos" or "Hammam-Gurbos" now stands upon; and that the hot-bath near it is the "Aquæ Calidæ" of Livy (l. xxx. 24.) which he places over against Carthage; informing us, that several vessels belonging to the fleet of Octavius were here shipwrecked.

CARPI, in *Geography*, a strong town of Italy, and capital of a principality in the duchy of Modena; taken by the French and abandoned in 1703, taken again by them in 1705, and retaken by prince Eugene in 1706: the see of a bishop, suffragan of Bologna; 7 miles N. of Modena. N. lat. 44° 45'. E. long. 11° 12'.

CARPI, a town of Italy, in the Veronese, situate on the Adige, and subject to the Venetians; famous for a victory

obtained by prince Eugene over the French in 1701. N. lat. 45° 10'. E. long. 11° 39'.

CARPI *extensor radialis*, *longior et brevior*, in *Anatomy*, are two muscles, which arise close to each other from the lower extremity of the os humeri: the latter having its origin from the external condyle, and the former from the outer margin of the bone, immediately above the condyle. They are closely connected together, lie immediately on the radius, and pass under the extensor tendons of the thumb. Their tendons run in a groove of the inferior extremity of the radius, where they are surrounded by a bursa mucosa, and then separate from each other; the longer muscle being inserted into the metacarpal bone of the fore finger, and the shorter into that of the middle finger.

The action of these muscles consists in drawing the back of the hand towards the outside of the fore arm, which motion is termed by anatomists, the extension of the wrist.

When the radius is prone, or supine, they will bring it into the middle state between these positions. The longer muscle may assist in bending the elbow.

Winslow, Albinus and Soemmerring call these muscles "Radiales externi, longior et brevior."

CARPI *extensor ulnaris* arises in common with some other muscles from the external condyle of the humerus, and from the upper part of the ulna. Its tendon, which commences about the middle of the fore arm, is bound down at the back of the ulna by a tendinous bursa mucosa, and is affixed to the metacarpal bone of the little finger. It extends the joint of the wrist, and may assist in turning the hand supine. This muscle is the ulnaris externus of several anatomists.

CARPI *flexor radialis* arises in company with the pronator teres, flexor sublimis, flexor carpi ulnaris, &c. from the inner condyle of the humerus. It passes obliquely across the ulna, and forms a tendon towards the wrist, which penetrating a canal on the os naviculare is fixed to the metacarpal bone of the index. It moves the palm of the hand towards the front of the radius and ulna, or in anatomical terms bends the wrist. It turns the radius into the prone position. Winslow, Albinus, &c. call this muscle "radialis internus."

CARPI *flexor ulnaris* arises by a common origin with the neighbouring muscles from the internal condyle of the humerus, and also from the margin of the ulna. It passes over this bone, receiving fibres all the way to the wrist. Its tendon is inserted into the os pisiforme of the carpus. It bends the wrist. It is called by many anatomists "ulnaris internus."

This muscle concurs with the extensor carpi ulnaris in producing a lateral motion of the wrist, in which the ulnar side of the hand is moved towards the ulna. The extensores carpi radiales and the flexor carpi radialis draw the radial side of the hand towards the radius. When the wrist is bent, or extended without any inclination to either side of the fore arm, the effect is produced by the combined action of the radial and ulnar flexors or extensors.

CARPIANI, in *Ancient Geography*, a people of European Sarmatia, who, according to Ptolemy, inhabited the district between the Peucini and the Basterni.

CARPIGNANA, in *Geography*, a town of Italy, in the Novarese; 12 miles N.W. of Novara.—Also, a town of Naples, in the province of Otranto; 7 miles N.W. of Otranto.

CARPINUS, in *Botany*, (a Latin radical) hornbeam, or hardbeam tree, French charme, charmillle. Tourn. p. 582. Linn. Gen. 1073. Schreb. 1449. Juss. p. 409. Gært. 536. Class and order, *monœcia polyandria*. Nat. ord. *Amentaceæ*. Linn. Juss.

Gen. Ch. *Male flowers* in a cylindrical ament or catkin.

Scales

Scales loosely imbricated, ovate, concave, acute, often villous or ciliated, one-flowered. *Cor.* none. *Stam.* filaments about ten, very short; anthers didymous, compressed, villous at the tip.

Female flowers in a squarrous, loose, pendulous ament. *Scales* oblong, entire, or divided, a little villous. *Cor.* none. *Fist.* germ two-celled, compressed, with the rudiments of two seeds, but one generally abortive; styles two, filiform. *Peric.* nut one celled.

Ess. Char. Male. *Scale* of the ament roundish. *Cor.* none. *Stamens* from eight to twenty. Female. *Scale* of the ament oblong. *Cor.* none. *Germ* two-celled. *Nut* one or two-celled.

Species. 1. *C. Betulus*, Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Il. Pl. 780. Gært. tab. 89. fig. 2. Duham. Arb. tab. 42. (*Ostrya fructu in umbilicis foliaceis*, Bauh. Pin. 427. Raii Syn. 451.) "Scales of the strobiles flat." Linn. "Strobiles leafy, loose; scales deeply trifid; lobes lanceolate, the middle one longest." Lam. A tree, sometimes sixty or seventy feet high, but slender in proportion to its height, never increasing to much more than a foot in diameter. Its most common height, in the woods of Picardy and Flanders, is from forty to fifty feet. *Trunk* tolerably straight, but often imperfectly cylindrical; bark even, whitish, marked with grey spots; branches numerous. *Leaves* about three inches long and two broad, alternate, petioled, ovate, acuminate, doubly serrated, smooth, wrinkled above, with straight and parallel veins below, remaining on the tree in a withered state during the whole winter. *Male catkins*, about an inch long, lateral, solitary, appearing in spring a little before the leaves; scales ferruginous, concave, ciliated. *Female catkins* terminal, solitary, peduncled, loose; scales green, smooth, with three lanceolate lobes, of which the middle one is largest; nut small, ovate, lenticularly compressed, striated, with longitudinal, filiform ribs; crowned with six, or, according to Scopoli, four teeth, seated at the bottom of the permanent enlarged scale. A native of woods in many parts of Europe. There is a variety with pinnatifid-angular leaves. 2. *C. orientalis*, Lam. ii. Cor. 40. (*C. betulus*, β . Mart. Mil.) "Strobiles leafy, short; scales dilated, ferrate-angular, nerved, flat, abbreviated on one side." A tree, from eighteen to twenty feet high. *Trunk* rather crooked and knotty, with a brown or greyish bark; branches finely divided, often pubescent towards the summit. *Leaves* smaller than those of the preceding species, less wrinkled, on villous petioles, falling off before winter. *Male catkins* from six to eight lines long, solitary; scales smooth; anthers bearded. *Female catkins* short, villous, whitish; scales not three-lobed as in the preceding species, but irregularly dilated, flat, nerved, angular, and toothed. *Nut* very small, crowned with teeth. A native of the East. 3. *C. duinenfis*, Mart. 4. Scop. Carn. 1190. tab. 60. "Scales subcordate, doubly toothed; female ament ovate." About two fathoms high. *Trunk* soon dividing into branches. *Leaves* ovate-acuminate, doubly serrated, smooth, hardish, on short petioles, with two deciduous stipules at the base, *Female aments* a little longer than the leaves; scales imbricated, ovate or semicordate, hard, inflexed on one side to the base; germ covered by the flexure of the scale, not striated as in *C. Betulus*, glossy, crowned with five teeth. A native of Carniola. 4. *C. ostrya*, hop hornbeam, Linn. Sp. Pl. 2. Mart. 2. Lam. 3. (*Ostrya fructu lupino simili*, Bauh. Pin. 427. *Ostrya italica*, Mich. Gen. 223. tab. 104. fig. 1, 2. Scop. Carn. 1191.) "Scales of the strobiles inflated." Linn. "Strobiles resembling those of the hop, ovate; leaves ovate-acute; buds obtuse." Lam. In general habit resembling the common hornbeam, but

smaller. *Leaves* less wrinkled, ovate, acuminate, doubly toothed, with ferruginous nerves. *Male catkins* long, pendant, fasciculated; filaments branched; anthers emarginate. *Female catkins* resembling those of the hop; scales inflated, closed on every side, villous at the base; nut two-celled, not crowned with teeth, hard, smooth, conical. A native of Italy and Germany. 5. *C. virginiana*, Miller, Lam. 4. Pluk. Phyt. tab. 156. fig. 1. "Strobiles resembling those of the hop, long; leaves ovate oblong, acuminate; buds acute." Lam. Perhaps only a variety of the former, as Linnæus and Duhamel considered it, differing chiefly in the size and form of the leaves, and the length of the female catkins. Its fruit is exactly similar. Lam. According to Miller it is about thirty feet high, and of quicker growth than the other species, shedding its leaves in autumn, about the same time with the elm, and resembling the long-leaved elm more than the hornbeam. A native of Virginia and Canada.

Obs. Authors differ much from each other in describing the structure of the female flower. Linnæus ascribes to it a one-leafed, six-cleft, calyx-shaped corolla, with two of the segments larger than the rest. La Marck gives it a one-leafed, somewhat campanulate, six-cleft, superior calyx; and Gærtner adopts the same idea. Jussieu, as we apprehend, justly doubts whether the teeth, which crown the germ, constitute a proper calyx, and whether the germ should not rather be considered as naked and superior, like all the others of its natural family. As this part, or appendage, is wanting in the last two species, it must be excluded from the generic character, or, as La Marck proposes, those two species must form a distinct genus. Jussieu also is inclined to separate them from carpinus, not however, on account of these teeth, but of the inflated scales, which he thinks should rather be called foliicles of the branched filaments, of the emarginate anthers, and of the two-celled nut.

Propagation and Culture. The common hornbeam is valued as a timber tree in France and Germany. Its wood is hard and tough, and is an excellent material for wheel-cogs, screw-presses, heads of beetles, handles of working tools, and other purposes in which strength is required. Mr. Evelyn recommends it also for turners' use; but M. Feuille, a French writer, asserts, that it is too brittle for cabinet work. Its trunk, according to him, is seldom regularly grained, and still more rarely well rounded. The texture of its fibres is singular: its annual layers are not uniformly circular as in the other trees, but assume an undulated or zig-zag form; and its transverse fibres, which pass from the circumference to the centre, have considerable intervals between them; the wood is consequently refractory under the workman's tool, and apt to break into splinters. It is also in great request abroad as a durable fuel, producing a vigorous flame, and yielding a powerful heat. In England it is said, by Mr. Evelyn, to be most abundant in Hertfordshire, and to be rare westward; but, as Mr. Miller observes, it is seldom suffered to grow as a timber tree, being generally reduced to a pollard by the country people. The largest and the lofliest we have ever seen are in Bramham park, between Leeds and Tadcaster, in Yorkshire, where they form a part of those stately elipt avenues which distinguish that curious specimen of ancient ornamental gardening. The pleasing verdure and luxuriance of its foliage, and its ready submission to the shears of the gardener, strongly recommended it to our formal ancestors as admirably fitted for espalier hedges, and close plantations intended to shelter tender perennial exotics. The property of preserving its withered leaves throughout the winter, which it possesses in common

common with the beech, and which honest Evelyn, attentive only to beautiful effect, reluctantly calls an infirmity, makes it eminently proper for the last mentioned purpose. Our venerable dendrologist speaks with rapture of the espalier hedge in the Luxemburg garden at Paris, and of the cradle walk at Hampton-court; and while the passion for architectural gardening prevailed, the hornbeam was profusely cultivated in our nurseries. Brown, and his numerous followers, have now produced a more natural taste, and the demand for it has consequently diminished. It is still, however, entitled to the attention of the planter: and as, according to Evelyn, it preserves itself best of all the foresters from the brutting of deer, it is peculiarly proper for parks.

When intended for hedges or underwood, it is generally propagated by layers, but for timber-trees it should always be raised from seeds. These should be sown in the autumn, soon after they are ripe, and in two years time will be fit to transplant to the situation where they are to remain. If not intermixed with other trees they should be planted pretty close, especially on the outside of the plantations, that they may protect and draw each other up. If sown in the spring the seeds should be previously kept in sand. In that case they will lie in the ground till the spring following, when, about the month of February, the surface should be gently loosened and sprinkled with fresh mould. After remaining three years in the native beds, the straightest plants should be transplanted for trees, and the rest be removed to ten feet rows, and set five feet from each other, where, in four years, they will be fit to be again transplanted for hedges. Some prefer the spring for transplanting: others early in October. The tree plantations should be thinned with caution, so as not to let in too much cold at once.

The hop hornbeam has in England been generally grafted upon the common hornbeam. This practice is condemned by Mr. Miller, the trees so raised being seldom of long duration: for, as the graft usually grows much faster than the stock, in a few years there is such a disproportion in their size, that, when exposed to high winds, they are frequently broken at the point of their union.

CARPINUS viscosa, Burm. Zeyl. tab. 23. See *DODONÆA viscosa*.

CARPIO, in *Geography*, a town of Spain, in the country of Leon: 3 leagues W.S.W. of Medina del Campo.—Also, a town of Spain, in the province of Cordova; 8 leagues N. of Cordova.—Also, a town of Spain, in the province of Estramadura; $2\frac{1}{2}$ leagues from Badajoz.

CARPIONE, GIULIO, in *Biography*, a painter of great eminence, was born at Venice, in 1611, made a very considerable proficiency under Alessandro Varotari, called Paduanino, and in a very short time acquired a very great reputation for design, invention, and a charming tint of colouring. His pictures are generally small, and the subjects which he commonly selected were bacchanals, processions, and triumphs, in which he excelled; so that his paintings were highly valued and much sought after: they are now very rare, and bear a high price. He also etched several plates, which, though slight, are performed in a very masterly manner, and exhibit some resemblance to those of Guido. From his own composition, we may notice "Bacchanalian subjects, with Boys playing, &c.;" "Love blinding Temperance;" "Christ in the Garden of Olives;" "A holy Family, with Angels, and the Deity represented above;" and "A Repose; the Virgin reading, and Joseph standing by her." This artist died in 1674. Strutt. Pilkington.

CARPIONE, in *Ichthyology*, a name given by some old writers to the fish called in England the charr. See *SALMO alpinus*.

CARPIS, in *Ancient Geography*, a city of Pannonia, placed by Ptolemy near the Danube.—Also, a river, which ran into the Ister, on the northern side. See also *CARPI*.

CARPOBALSAM, or *CARPOBALSAMUM*, the fruit of the tree which yields the true oriental balm, or balsam; very much resembling, both in figure, size, and colour, that of turpentine. The word comes from *καρπος*, fruit; and *βαλσαμος*, balsam. The *carpobalsamum* is an oblong fruit with a short foot-stalk, a brown wrinkled rind, marked with four ribs; of a grateful taste and smell. See *BALSAM*.

CARPOBOLUS, in *Botany*. See *LYCOPERDON carpobolus*.

CARPOCRATIANS, in *Ecclesiastical History*, a branch of the ancient Gnostics, so called from *Carpocrates*, who, in the second century, adopted and taught philosophical tenets, which agree, in general, with those of the Egyptian Gnostics. He was born at Alexandria, and flourished about the middle of the second century. He acknowledged the existence of one God, eternal and incomprehensible, who made angels and powers of different orders, and to some of these he ascribes the formation of this lower and visible world. He taught that Jesus was the son of Joseph and Mary, according to the common course of nature; that he was endued with a most pure soul of great capacity and understanding, and that he retained the remembrance of the things which he had seen with the father, in his pre-existent state, which he revealed to men; that he wrought miracles, and excelled in the holiness of his life, and in all virtue; and that he lived among the Jews, and suffered death; after which his soul ascended to heaven and returned to God. He also inculcated the pre-existence of human souls; and expected the salvation of the soul only, and not the resurrection of the body. Some have asserted, that his doctrine, with regard to practice, was in the highest degree licentious. Accordingly, he is charged with not only allowing his disciples to sin, but recommending to them a vicious course of life, as a matter of obligation and necessity; and with asserting, that eternal salvation was attainable only by those who had committed all sorts of crimes, and had daringly filled up the measure of their iniquity. It is also said, that, though he acknowledged the laws which Christ enjoined on his disciples, he held that lusts and passions, being implanted in our nature by God himself, were not criminal and culpable; that all actions were indifferent in their own nature, and were rendered good or evil only by the opinions of men, or by the laws of the state; that it was the will of God, that all things should be possessed in common, the female sex not excepted; but that human laws, by an arbitrary tyranny, branded those as robbers and adulterers, who only used their natural rights. It has been said also, on the authority of some ancient writers, that the Carpocratics marked their disciples on the back part of one of their ears; that they had pictures and images of Christ and his apostles, and of some heathen philosophers and poets; and that they honoured them with superstitious rites. They are charged also, not only with maintaining the community of women, but with allowing lewd and lascivious practices at their suppers, or love-feasts; and they were chargeable with unnatural uncleanness, as well as magic. Dr. Lardner, with his usual impartiality and candour, examines the ground of these charges, and inclines to think that the immoral principles and immoral practices ascribed to them are not proved, and that the charges are owing to mistake or prejudice, or both. There might, he says, be loose and wicked

men among the Carpocratians, as there were in other sects; but that they were countenanced either by Carpocrates, or by his son Epiphanius, who taught the same opinions with his father, and had many followers, though he died at the age of 18 years, or by the principles they taught, does not appear to him to be probable. Epiphanius says, that they rejected the Old Testament; but Dr. Lardner conjectures that possibly the fact only was this, that they did not respect the instructions of Moses and the prophets equally with those of Christ and his apostles. He apprehends also, that they received all the books of the New Testament, as they were received by other Christians in their time. Mosheim, Eccl. Hist. vol. i. p. 227, &c. Lardner's Works, vol. ix. B. ii. ch. 3. p. 308—319.

CARPODETUS, in *Botany*, (from καρπος, fruit, and δειν, to bind, the fruit being furrounded or bound by a ring or fillet) Schreb. gen. 360. Mart. Willd. 410. Juss. 382. Forst. gen. 17. Class and order, *pentandria monogynia*. Nat. Ord. *Rhamni*. Juss.

Gen. Ch. Cal. Perianth top-shaped; adhering to the germ, five-toothed: teeth awl-shaped, deciduous. Cor. Petals five, ovate, small, inserted into the margin of the calyx: anthers roundish. Pist. Germ inferior (seminiferum: Juss.) style filiform, longer than the stamens: stigma capitate, depressed. Peric. Berry dry, globular, furrounded as with a ring by the adhering margin of the calyx, (seminifera, Juss.) five-celled. Seeds several, somewhat angular.

Eff. Ch. Corolla pentapetalous, inserted into the margin of the calyx. Berry inferior, dry, five-celled, annulated.

Sp. *Carpodetus ferratus*. Forst. Prod. iii. gen. p. 33. tab. 17. A native of New Zealand. According to Bosc. (nouv. dict.), it is one and the same plant with *Ceanothus asiaticus* of Linnæus.

CARPOLOGY is that part of *Botany* which treats of the fruit of plants in the most extensive sense of the word; describes its various appearances, divides it into distinct kinds, analyses it into its several parts, and forms the whole into a regular system. See **FRUIT**.

CARPUDEMUM, in *Ancient Geography*, a town placed by Ptolemy in the interior of Thrace.

CARPUS, in *Anatomy*, is the term applied to the wrist. See **SKELETON**.

CARPUETH, in *Geography*, a town and fortress of Asiatic Turkey, in the province of Aladulia; 12 miles from Arzenum.

CARPZOVIANUS, in *Biblical History*, is the denomination of a MS. of the four gospels, marked 78 in the first part of Wetstein's New Testament, which Küster, judging from the letters, supposed to be 600 years old. Gottlob Carpzow of Leipzick had it in his possession, and Küster procured from Dr. Boerner those extracts, which he inserted in Mill's edition of the Greek Testament.

CARPZOVIVS, BENEDICT, in *Biography*, was born in 1595, and succeeded his father, who was an eminent lawyer, as counsellor to the elector of Saxony, and assessor of the judges of appeals. His acquaintance with the jurisprudence and legal practice of Germany was very extensive; and by availing himself of an industrious research into the constitutions and determinations preserved in the various archives of the country, he was the best writer on these subjects. Of his numerous works the principal are as follow, viz. "Practica rerum criminalium," fol. published in 1635, and several times reprinted and abridged; "Definitiones forenses, vel jurisprudentia forensis Romano-Saxonica ad constitutiones electoris Augusti," 1638, fol.; A commentary "Ad legem regiam Germanorum," 1640; "Responsa juris electoralia;" fol. 1642; "Definitionum ecclesiasticarum seu consistorialium,"

&c. 1649; "Decisiones Saxonicae," 3 vols. 1646—52—54; and "Processus Juris Saxonicae," fol. 1657. The close of his life at Leipzick was devoted altogether to the study of the scriptures, which he had read over, as it is said, 53 times, besides commentaries. He died in 1666. Several others of the same family and name distinguished themselves as theologians and philologists.

CARR, in *Agriculture*, is a sort of cart made use of in some districts for conveying light weights. There is an improved kind of carr, which is much employed in Leicestershire, for conveying dung and other similar matters upon land in an easy and expeditious manner, as a good horse is capable of drawing near a ton weight in it. It is constructed in the following manner. The diameter of the wheels is four feet; the length of the body the same; the width of the body three feet ten inches; the extent of the shafts ten feet. Rails are capable of being occasionally put on for the purpose of carrying turnips, or other roots of a similar kind. It is made by Mr. Handford, of Hathern; and costs when complete, 5*l.* 15*s.* 6*d.* and; with an iron axle-tree, 6*l.* 16*s.* 6*d.* This sort of carriage was found very useful for various purposes on Mr. Bakewell's farm. And the improved Irish Carr is another useful sort of carriage of this kind, which was much recommended by the same intelligent farmer. It is observed, in the second volume of communications to the Board of Agriculture, that "its principal advantages consist in the facility with which it is loaded, from its lowness; and where gateways and roads are narrow, much room being gained by having the wheels under the body of the cart. In such situations, this cart seems well calculated for carrying manure, especially on meadow or ploughed land; and for that purpose its wheels ought to have a flat bearing, and be at least six inches in breadth. Another advantage of this carr is, that from its construction the wheels are necessarily cylindrical, at least they are not necessarily conical; and the facility of draught arising from this unobserved circumstance has probably been imputed to some other part of the construction, as we find by experiment, that the resistance to the cylindrical wheel is not increased, but diminished by increasing the breadth, and the flat bearing of its rim. The knowledge of this fact is of very great importance to the farmer, as well as to the waggoner, since by this means, he may be enabled, in almost all seasons, to drive his broad-wheeled carts, &c. on his meadow or plough grounds when no narrow wheel can be used; the advantages of which are too well known to be here insisted on: but when the width of gateways, and the breadth of roads, will admit of the wheels being placed at the sides of the cart, without confining the width of its body, it will probably be more advantageous to have them sideways than under the cart." A carr of this nature is represented at fig. 2. Plate III. of *Agriculture*.

CARR, carrum, in the *Middle Age*, denoted any sort of vehicle, or carriage, either by land or sea.

CARR, Carrus, a kind of rolling throne, used in *Triumphs*, and at the splendid entries of princes.

The word is from the ancient Gaulish, or Celtic, *carr*; mentioned by Cæsar, in his Commentaries, under the name *carrus*. Plutarch relates, that Camillus having entered Rome in triumph mounted on a carr drawn by four white horses, it was looked on as too haughty an innovation.

CARR is also used for a kind of light or open chariot. Pontanus observes, that Erichthonius was the first that harnessed horses, and joined them in a carr or chariot. The carr, on medals, drawn either by horses, lions, or elephants, usually signifies, either a triumph, or an apotheosis: sometimes a procession of the images of the gods, at a solemn supplication;

supplication; and sometimes of those of some illustrious families at a funeral.—The carr covered, and drawn by mules, only signifies a consecration, and the honour done any one of having his image carried at the games of the circus. See CONSECRATION.

The carr used by the ladies was called *pilentum, carpentum, and basterna*. See COACH.

CARR, in *Geography*, a small plantation in the county of Lincoln and district of Maine, North America.

CARRA, a river of the county of Kerry, Ireland, which rises in Magillicuddy's reeks, W. of the lake of Killarney, and after a rocky course of a few miles flows into a lake of the same name, from which its waters are emptied into the bay of Castlemain. On, or very near the banks of this river was the village of *Blackstones*, a romantic spot where Sir W. Petty erected iron works, which continued as long as the timber on the neighbouring mountains supplied wood for charcoal; but when this was exhausted, from neglect of coping, the works ceased, and the village has gone to decay. Smith's Kerry.

CARRAC, or CARRACA, a name given by the Portuguese to the vessels they send to Brasil and the East Indies; being very large, round built, and fitted for fight as well as burden. Their capacity lies in their depth, which is very extraordinary. They are narrower above than underneath, and have sometimes seven or eight floors; they carry about 2000 tons, and are capable of lodging 2000 men; but of late they are little used. Formerly they were also in use among the knights of Rhodes, as well as among the Genoese, and other Italians.

It is a custom among the Portuguese, when the carracs return from India, not to bring any boat or sloop for the service of the ship, beyond the island of St. Helena; at which place they sink them on purpose, in order to take from the crew all hopes or possibility of saving themselves, in case of shipwreck.

In the year 1592, a Portuguese carrack was captured by Sir John Barrrough which is thus described. "This carrack was in burthen no less than 1600 tons, whereof 900 were merchandise: she carried 32 pieces of brass ordnance, and between six and seven hundred passengers: was built with decks, seven story, one main aloft, three close decks, one fore-castle, and a spare deck, of two floors apiece. According to the observations of Mr. Robert Adams, an excellent geometrician, she was in length from the beak-head to the stern 165 feet; in breadth near 47 feet; the length of her keel 100 feet: of the main-mast 121 feet; its circuit at the partners near 11 feet; and her main-yard 106 feet."

CARRACA, in *Ancient Geography*, a town of Italy, in the country of the Bechuni according to Ptolemy; supposed to be *Caravaggio*.

CARRACCI. See CARACCI.

CARRÆ, in *Ancient Geography*, a town of Asia, in Syria, situate to the east of a chain of mountains, on the banks of a small river, S. W. of Gozia; and at some distance to the east of Heliopolis.

CARRAGH Lough, a very pretty lake of the county of Mayo, Ireland, 5 miles long and $2\frac{1}{2}$ broad, with wooded peninsulas and islands. In the surrounding barony which is called from it, and includes the town of Castlebar, the linen manufacture is carried on in a manner superior in neatness to most parts of the county.

CARRAGHROE Mountains, mountains in the western extremity of the county of Tyrone adjoining the county of Donnegal, and North of Lough Derg. Beaufort.

CARRAGO; in *Antiquity*, a kind of fortification, or de-

fence about a camp, composed of carts, waggons, and the like vehicles, chained or fastened together; chiefly used by the barbarous nations.

CARRANTAGEA Lagoon, in *Geography*, a large gulf on the south side of the bay of Honduras, about 70 miles N. W. of Cape Gracias a Dios, and nearly as far S. E. from Brewer's Lagoon.

CARRANZA, BARTHOLOMEW, in *Biography*, an eminent catholic prelate, was born in 1503. at Miranda in Navarre, entered among the Dominicans in Castile, taught theology with high reputation at Salamanca, and distinguished himself in the council of Trent by his zeal in maintaining the duty of clerical residence. In 1554 he was taken to England by his pupil Philip of Austria, afterwards king of Spain, when he went to marry queen Mary, with a view of successfully combating protestantism, for which he was not deficient in his ardent efforts. He was appointed confessor to the queen, and in recompence of his services to Philip, was promoted by him, in 1557, to the rich archbishopric of Toledo. He had the honour of attending the emperor Charles V. at his death, and of administering to him the last sacraments. However he was soon after suspected of heresy, and in 1559 committed to the prison of the inquisition. In his way thither he said to his companions; "I go between my best friend and my worst enemy; my friend is my innocence; my enemy is my archbishopric of Toledo." After a confinement of 8 years in Spain, he appealed to Rome, and removing thither, it was not till after the expiration of 9 years more, viz. in 1576, that sentence was pronounced against him. The sentence of this detestable court was founded on mere suspicion; and on the ground of the strong presumptions that were alleged against him, he was condemned to make a solemn abjuration of his supposed errors. In consequence of this sentence to which he submitted with resignation, he retired to the convent of Minerva, which belonged to his order. Here he soon after died in his 72d year, protesting his innocence as to any mental offence respecting the faith, but at the same time acknowledging the justice of the proceedings against him. Such was his reputation for sanctity, and so impressed were the minds of the people with respect to his innocence, that on the day of his funeral, the shops were shut; and his remains were venerated like that of a saint. Gregory XIII. placed on his tomb an epitaph, which did justice to his memory, and which represents him as illustrious both for his learning and his morals, modest in prosperity and patient in adversity. His principal works are "Summa Conciliorum," 1681, 4to; a Collection of Councils held under the popes from St. Peter to Julius III.: a Latin treatise "On Residence," 1547; and a "Spanish Catechism," which was put into the prohibited index by the inquisition. Gen. Dict. Nouv. Dict. Hist.

CARRAPATEIRA, in *Geography*, a town of Portugal, in the province of Algarve; 10 miles N. of Sagres.

CARRARA, a town of Italy, in the principality of Massa; 3 miles N. of Massa, celebrated for its marble.

CARRARA marble, among our *Artificers*, the name of a species of white marble, which is called *marmor lunense*, and *ligustrium* by the ancients: it is distinguished from the Parian, now called the statuary marble, by being harder and less bright.

CARRAT, CARAT, or CARACT. See CARACT.

CARRE, LOUIS, an eminent mathematician, was born in 1663 in the province of Brie in France. His father intended him for the church, and he was engaged for three years in the study of theology; but refusing to take orders, his means of subsistence at Paris were discontinued; and in this distressed situation he found an asylum under the pa-

tronage of Father Mallebranche, who employed him as an amanuensis. Here he acquired the mathematics and the most sublime metaphysics. Having continued seven years in this excellent school, he undertook to teach the mathematics and philosophy, and succeeded to such a degree as to attach a great number of scholars, many of whom were females; of whose understandings in general, he formed a higher opinion than he did of those of men. In this situation his time was so much employed, that he had not leisure to pursue those researches in the sublime geometry to which his taste inclined him. However, in 1697, he was admitted as an eleve into the Academy of Sciences by the favour of M. Varignon; and in 1700 he published the first entire work which had appeared on the integral calculus, under the title of "A Method of measuring surfaces and solids, and finding their centres of gravitation, percussion, and oscillation." This work was afterwards corrected and improved in a second edition. Under the patronage of Varignon, Carré soon became associate, and afterwards pensioner: and he was thus enabled to devote his whole time to study. As he occupied the office of mechanic, he directed his principal views to that subject, and contrived every thing that relates to music, the theory of sounds, the description of different instruments, &c. But his labours were interrupted by ill health, and at length he closed his life with fortitude and calmness on the 11th of April, 1711, in the 48th year of his age. Many of his mathematical and philosophical treatises were left to the Royal Academy, and remain unpublished. His memoirs in the volumes of the Academy are the following: viz. "The Rectification of Curve Lines by Tangents," 1701; "Solution of a Problem proposed to Geometricians, &c." 1701; "Reflections on the Table of Equations," 1701; "On the Cause of the Refraction of Light," 1702; "Why the Tides are always augmenting from Brest to St. Malo, and diminishing along the Coasts of Normandy," 1702; "The Number and the Names of Musical Instruments," 1702; "On the Rectification, &c. of the Caulstics by Reflection," 1703; "Method for the Rectification of Curves," 1704; "Observations on the Production of Sound," 1704; "On a Curve formed from a Circle," 1705; "On the Refraction of Musket-balls in Water, and on the Resistance of that Fluid," 1705; "Experiments on Capillary Tubes," 1705; "On the Proportion of Pipes to have a determined Quantity of Water," 1705; "On the Laws of Motion," 1706; "On the Properties of Pendulums, with some new Properties of the Parabola," 1707; "On the Proportion of Cylinders, that their Sounds may form the Musical Chords," 1709; "On the Elasticity of the Air," 1710; "On Catoptries," 1710; "On the Monochord," &c. &c. *Eloge par Fontenelle*, 1711. *Rozier's Index*.

CARRÉ, HENRY, a painter of reputation, was born, as Weyerman and Descamps say, at Amsterdam, in 1656, but according to Houbraken in 1658, and became a disciple, first of Jurian Jacobsz of Hamburgh, and afterwards of Jacques Jordaens. As state painter at the court of Frizeland, he adorned the palace with several fine paintings, particularly landscapes, in which he introduced huntings of the wild boar and of other animals, in all which subjects his manner resembled that of Sayders. However, he spent the greatest part of his life at Amsterdam and the Hague, where his works were in high esteem. His usual subjects were landscapes, with peasants attending flocks of sheep, or herds of cattle; huntings; and sometimes conversations. His style was pleasing, and his manner of colouring good; his figures were well designed, and touched with spirit; though many of his pictures shew too great a degree of darkness. He died in 1721.

CARRÉ, MICHAEL, the younger brother of the former, was born at Amsterdam in 1666, and having commenced the study of his art under his brother, accomplished himself in his profession as the disciple of Nicholas Berchem; he afterwards preferred the style of Vander Leew to that of Berchem. He resided several years in London, without obtaining much employment or reputation. After his return to his native city, he was invited to the Prussian court and liberally recompensed for his works as an artist. His taste led him to embellish grand saloons, halls, and large apartments; and in works of this kind he was fond of introducing subjects that excited terror; such as storms with lightning, the destruction of castles and towers, and the tearing up of trees by the roots. In his easel pictures he had a ready hand, and a neat manner of pencilling. *Pilkington*.

CARREA *Pollentia*, in *Ancient Geography*, a town of Italy, in Liguria, N. of *Augusta Vagiennorum*, celebrated for its black wool.

CARREI, a people who, according to Pliny, inhabited the interior of Arabia Felix, and to whom he assigns the town of Carriatha, called by Ptolemy Chariatha.

CARREI, in *Antiquity*, a closet or apartment for privacy and retirement. This term, which has been long disused, was principally applied during what are called the middle ages to the closets for study which were usually given to each monk in the cloister of his monastery. In the visitations of the old religious houses the prior or superior is frequently enjoined to visit these *Carole*, or cells, once or twice a year. (See Cowel's *Law Interpreter*, v. CAROLA.)

CARRHÆ, in *Ancient Geography*, a very ancient city of Asia in Mesopotamia, near the Euphrates, at the distance of eighty miles from Hierapolis. It was famous for the defeat of the Romans by the Parthians, and the death of Crassus, the Roman general, and also for a temple of the moon. M. D'Anville places it to the west of a small chain of mountains, which separated it from Chaboras. See HARAN.

CARRI, in *Geography*, a town of Italy, in the province of Piedmont; eight miles N.N.W. of Ceva.

CARRIAGE, a vehicle for the conveyance of persons, goods, &c. from place to place.

CARRIAGE *Artillery*, in French *affuts des canons*, are wooden frames or machines, on which cannons are mounted and transported from one place to another. They are of various kinds.

Garrison-gun-carriages are those, on which garrison-guns are commonly mounted. Such a carriage with its gun on it moves on four cast-iron trucks or small low wheels seldom exceeding twenty-four inches in diameter.

A *Ship-gun-carriage* differs from a garrison-gun-carriage only in having its trucks of wood, and breach-rings, which the other has not.

There are copper clouts underneath the axle-trees of garrison-carriages to diminish the friction of the iron on the wood.

Travelling-carriages and field carriages are such as guns are mounted and transported on when employed at sieges or on service in the field. They are much longer than garrison or ship gun-carriages and are differently constructed. Every such carriage has two wheels and a long trail. And the limber for moving it with by means of the pintle-pin or iron bolt has two wheels also.

Limbers, are two-wheel-carriages, made commonly each with two shafts, but sometimes with a beam or pole, for drawing double with. They support the trails of travelling or field carriages, by means of the pintle-pins or iron bolts, when the guns are to be transported, or removed from one place

place to another. The pieces are generally fired with the trails of their carriages taken off from the limbers—but they may be fired with them on the same, and sometimes are on a march when attacked, or pressed on by an enemy.

Galleys-carriages, are for one and a half pounders. Such a carriage has shafts to be drawn without a limber, and is regarded by many artillerymen, as more convenient than other field-carriages, and preferable to them. It is a carriage, that answers very well also for a light three, or six pounder.

Howitzer-carriages, are for supporting, and transporting howitzers. Those for the 6 and $\frac{5}{8}$ inch howitzers are made with screws, for elevating them in the same manner as the light six-pounder-carriages are. They are therefore made without a bed, and the centre-tranform is nine inches broad for fixing the elevating screw in, instead of four, as in those that are made without such a screw. In the centre, between the trail and centre-tranform, there is a tranform-bolt, which is not in others, because the centre-tranform must be made to be taken out; and when it is, the howitzer may be elevated to any degree under ninety.

Tumbrel, or *Tumbrel-carriages*, are carriages with two wheels, commonly made use of for carrying the pioneers', miners', and artificers' tools. They are also sometimes employed for carrying the money of the army.

Block-carriage, is one that is made out of a solid block, or piece of timber, so hollowed or cut into, as to receive the gun or howitzer into the cap-squares: the flat, or lower part of the cap-square is let into the solid wood, and the gun or howitzer is elevated or depressed by means of a screw, as on another carriage. The limber of this carriage carries two large chests for ammunition, and takes four men. The pintle-pin, or iron bolt of the limber, is so constructed as to take the gudgeon of the carriage, by which means a greater relief is obtained when the carriage passes over rough or uneven ground. Block-carriages are chiefly made for the purpose of conveying mortars and their beds from one place to another.

Block-carriages are also used by the horse-artillery, as carriages. They are very useful on service. The original inventor of these is the ingenious General Congreve, to whom the Board of Ordnance is indebted for many improvements, and the nation for important services; which merit attention and recompence.

Truck-carriages, are for carrying timber and other heavy articles from one place to another, at no great distance from it. They are also employed for moving guns and mortars, where their own carriages cannot go, and are drawn by men as well as horses and other beasts of burthen.

A *Ponton-carriage* is solely for transporting the pontons. Formerly it had only two wheels, but now it has generally four.

Besides these, there are other artillery carriages, as land and sea mortar-beds, which have no wheels, as mortars are not transported on their carriages; powder carts; ammunition waggons; sling waggons; travelling forges; and pontons.

Figure 1. (See *Artillery-carriages* in the plates) is the outside elevation or profile of a garrison or ship carriage; and *fig. 2.* is the inside elevation of one of the cheeks or side pieces, shewing some of the irons in it, that would not otherwise be seen; the manner in which these pieces should be let into the axletrees, and the position of the tranform.

The height of each side-piece before, is equal to $4\frac{3}{4}$ diameters of the shot, and its height behind is only half as

much. The length of the side-piece is supposed to be bisected or divided into two equal parts, and of these two, the hind part is supposed to be divided into four equal parts, as a scale for making the steps by. Each of these side-pieces is hollowed or cut out beneath, in the form of a circular arc, of which the radius is about half the length of the piece. This makes it somewhat lighter without diminishing its strength. Both the axletrees are sunk into the side-pieces in the manner represented in *fig. 2.* The tranform is placed directly over the fore-axletrees, in the middle of the height of the side-pieces, and is one diameter of the shot broad, and two deep.

The following are the names of the different pieces of iron-work in a ship and garrison-carriage, with the number of each. See *Artillery-carriages*, *fig. 1.* and *2.*

a. The curved parts of the cap-squares,	-	-	-	2
b. Eye-bolts,	-	-	-	2
c. Joint-bolts,	-	-	-	2
d. Tranform bolts,	-	-	-	1
e. Bed-bolt,	-	-	-	1
f. Bracket-bolts,	-	-	-	2
g. Hind axletree-bolts,	-	-	-	4
h. Breeching-bolts with rings,	-	-	-	2
k. Burs,	-	-	-	2
l. Loops,	-	-	-	6
m. Dowel-pins,	-	-	-	4
n. Square rivetting plates,	-	-	-	8
p. Rings with keys,	-	-	-	10
q. Traversing plates,	-	-	-	2
r. Linch-pins,	-	-	-	4
s. Axletree-hoops,	-	-	-	2
t. Axletree-stays,	-	-	-	2
w. Keys, chains, and staples,	-	-	-	2
x. Stoolbed-bolts, with rivetting plates,	-	-	-	2

N. B. The garrison-carriage has all these irons as well as the ship-carriage, except the two breeching-bolts with rings.

The construction of these carriages is as follows. See *fig. 3.* Let A B be any indefinite right line. In it take any two points, C, D, so that the distance between them shall be equal to three seventh parts of the gun's length, or to the distance from the centre of the trunnions to the extremity of the breech. Through these points draw two right lines at right angles to A B. On the first of these, take C E, C F, in opposite directions and each of them equal to half the diameter of the second reinforce-ring of the gun. On the second take also D G, D H, in opposite directions, and each of them equal to half the diameter of the base-ring. Then right lines drawn through the points E, G, and F, H, will determine the inside width of the carriage.

If parallel to these two last mentioned right lines, there be drawn two others at the distance of one caliber of the gun from them respectively, these again will determine the breadth of each of the side-pieces and the outside width of the carriage. And if, from D towards B, there be set off D I, equal to the length of the cables, and from C towards A, there be set off C K, equal to half the diameter of one of the trunnions, with half the diameter of one of the fore-trucks, I K will be the length of the carriage.

The right line E F, passes through the centre of the trunnion-holes, the diameter of each of which is equal to a caliber of the gun. The centre of each of these holes is about a quarter of an inch below the upper surface of the side-piece. Six inches are set on each side of G H, for the axletree, which is always twelve inches broad.

The

CARRIAGE.

The dimensions of such a carriage are specified in the following Table.

Natures of the guns.		42 Pounder	32 Pounder	24 Pounder	18 Pounder	12 Pounder	9 Pounder	6 Pounder	3 Pounder
		Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.
Width enclosed before	-	18.0	18.0	16.5	15.5	14.0	13.0	11.5	9.0
Width enclosed behind	-	23.5	23.5	22.5	21.5	19.5	18.5	16.8	12.5
Fore axle-tree length	-	57.0	57.0	54.5	51.5	45.5	42.5	38.8	32.5
Body	{ Length	35.4	36.6	34.9	33.1	29.5	27.5	24.8	19.5
	{ Height	10.8	10.8	10.0	10.0	10.0	9.5	9.0	8.5
	{ Breadth	6.8	6.8	6.8	6.0	5.5	5.2	5.0	4.0
Arms	{ Length	10.8	10.2	9.8	9.2	8.0	7.5	7.0	6.5
	{ Diameter	6.2	6.2	6.2	5.8	5.2	5.0	4.5	3.5
Hind axle-tree length	-	57.0	57.0	54.0	51.5	45.5	42.5	38.8	32.5
Body	{ Length	35.4	36.6	34.9	33.1	29.5	27.5	24.8	19.5
	{ Height	6.8	6.8	6.8	6.0	5.5	5.2	5.0	4.0
	{ Breadth	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Arms	{ Length	10.8	10.2	9.8	9.2	8.0	7.5	7.0	6.5
	{ Diameter	6.2	6.2	6.2	5.8	5.2	5.0	4.5	3.5
Fore-trucks	{ Diameter	19.0	19.0	18.0	18.0	16.0	16.0	14.0	14.0
	{ Breadth	6.5	6.0	5.5	5.0	4.5	4.0	3.5	3.0
Hind-trucks	{ Diameter	16.0	16.0	16.0	15.0	14.0	14.0	12.0	10.0
	{ Breadth	6.5	6.0	5.5	5.0	4.5	4.0	3.5	3.0
Side-pieces	{ Height before	26.8	26.2	26.0	23.6	20.0	18.8	16.0	13.6
	{ Length	78.0	78.0	72.0	69.0	66.0	63.0	60.0	37.5
	{ Breadth	6.5	6.0	5.5	5.0	4.5	4.0	3.5	3.0
Distance of trunnions from the head	-	8.0	8.0	8.0	8.0	6.8	6.6	6.6	6.0

Mr. Muller, in his "Treatise on Artillery," gives another construction for gun-carriages to suit his construction of guns. In constructing both he supposed the diameter of the shot to be divided into 24 equal parts; and on this supposition, in constructing the gun-carriage, he takes CD, (see fig. 3.) equal to six diameters of the shot, and ten parts; CE, CF, each equal to 34 parts; DG, DH, each equal to 39.5 parts; the breadth of each of the side-pieces equal to one diameter, or 24 parts; DI equal to one diameter and 12 parts; and CK equal to two diameters and a half. He makes the breadth of the fore axle-tree equal to 30 such parts; its length equal to six diameters and a third; the length of each of the arms equal to 44 such parts, and the diameter of each of them equal to 24 such parts. In the elevation he makes the height of each of the side-pieces before, equal to four diameters and three quarters, and equal to half that height behind. The height or depth of the fore axle-tree he makes equal to 42 such parts; and that of

the hind axle-tree equal to 30 such parts. The bed-bolt passes under the middle of the fourth step and is even with the last, or hind step.

He makes the breadth, or thickness of each of the wooden trucks equal to that of each of the side-pieces, which by his construction is equal to one diameter of the shot, or to 24 such parts; the diameter of each of the fore-trucks equal to four diameters of the shot, and that of each of the hind-trucks equal to three diameters and a half. These diameters, however, must of course be increased or diminished to suit the height of the port-holes in ships.

Of travelling, or field carriages. The long side-pieces, PQ, RS, (see fig. 12.) are called the cheeks; the fore part, QR, of the carriage, is called the breast, and the hind part, PS, the trail. T denotes the trail-transom; X the bed-transom; V the centre-transom; and Y the breast transom; GH the body of the axle-tree; W the pintle-hole; and m, n denote the trunnion-holes.

CARRIAGE.

The following are the dimensions of the cheeks.

Natures of the guns.	24 Pounder	18 Pounder	12 Pounder	6 Pounder	3 Pounder
	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.
Lengths of the cheeks	156.0	150.0	144.0	132.0	120.0
Thickness of ditto	5.8	5.2	4.6	3.6	3.0
Height of the plank	22.0	21.6	19.0	16.0	13.0
Height of the cheek	20.0	19.6	17.0	14.0	11.5
{ Before	17.0	16.6	15.0	12.0	9.5
{ Centre	12.0	11.6	11.0	10.0	7.5
{ Trail	74.0	72.0	69.0	60.0	51.5
Head from the centre	18.0	16.6	15.0	12.0	10.0
Length of the trail					

The following are the dimensions of the axle-trees.

Natures of the guns.	24 Pounder	18 Pounder	12 Pounder	6 Pounder	3 Pounder
	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.
Body	38.5	38.8	39.0	40.0	40.5
{ Length	7.0	6.8	6.5	6.0	5.5
{ Breadth	9.0	8.8	8.5	8.0	7.5
{ Height	21.0	20.8	20.5	19.0	17.5
Arms	7.0	6.8	6.5	6.0	5.5
{ Length	5.0	4.8	4.5	4.0	3.5
{ Body diameter	80.5	80.4	80.0	78.0	75.5
{ Linch diameter					
Total length					

And the following are the dimensions of each of the wheels.

Natures of the guns.	24 Pounder	18 Pounder	12 Pounder	6 Pounder	3 Pounder
	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.	Inches and deci- mals.
The diameter of each of the wheels	58.0	58.0	58.0	58.0	58.0
The length of the nave	17.5	17.5	17.0	15.5	12.5
Diameter of ditto	15.0	15.0	15.0	13.0	12.5
{ Body	16.0	16.0	16.0	14.0	13.0
{ Middle	13.5	13.5	13.5	10.0	10.0
{ Linch	5.0	5.0	4.5	4.0	3.0
Felloes, or fellies	6.5	6.5	6.0	5.5	5.0
{ Thickness	2.3	2.3	2.2	2.1	2.0
Spokes	4.5	4.5	4.0	3.5	3.0
{ Breadth					

The following are the names and numbers of the different irons, or pieces of iron-work in a travelling carriage.

Transom bolts with burs	1	Transom-bolts with hooks	2
{ Breaft	1	{ Centre	2
{ Centre	2	{ Trail	2
{ Trail	2	Trunnion-plates	2
		Cap-squares with joint-bolts	2
		Spring	

C A R R I A G E.

Spring keys with chains and staples	-	-	-	4	Hurlers with straps	-	-	-	-	2
Eye-bolts	-	-	-	-	2	Washers	-	-	-	2
Single fore-lock keys	{	Fore	-	-	2	Linch-pins	-	-	-	2
		Hind	-	-	8	Axle-tree bolt	-	-	-	1
Breast-plates	-	-	-	-	2	Single fore-locks	-	-	-	2
Bed-piece chain and staple	-	-	-	-	1	Clout-nails	-	-	-	12
Plates with roses	{	Garnish	-	-	2	Dog-nails	-	-	-	8
		Trail	-	-	2	Axle-tree hoops	-	-	-	2
		Bolts	-	-	2	The usual construction of travelling-carriages is the following. See <i>fig. 11</i> .				
Garnish	-	-	-	-	6					
Axle-tree bands	{	Nails	-	-	2	Let $A b c d$ be the plank, out of which one of the cheeks is to be made, and let $A B$ be the height of the said cheek before. Set off from B to C the sum of the said height, or of the head, $A B$, and the distance from the hind part of the trunnions to the extremity of the calcable. Then, from the point, A , as a centre with the radius, $A C$, describe an arc, in which, as a chord, apply a right line, $C D$, equal to the height of the cheek at the centre, and draw the right lines, $A D$, $B C$. On $B C$, take $B E$, equal to the head, $A B$, or height of the cheek before, and from the point, E , set off towards B the right lines, $E r$, $r S$, equal each to half the diameter of one of the trunnions. Then, $E S$ being equal to the diameter of the trunnion, cut the trunnion-hole out of the cheek, so that its centre may be about a quarter of an inch below the line, $B C$, or $E S$. From the point, r , draw the right line, $r F$, perpendicular to $A D$, or parallel to $A B$, and in $A D$, take $F H$, equal to the breadth of the axle-tree, which is funk or let in about an inch into the cheeks. On the right line, $F H$, constitute a square, and from I , the point of intersection of its diagonals, as a centre with a radius of 29 inches, which is equal to the radius of the wheel, describe an arc. This arc will represent a part of the wheel; and if a ruler touching the said arc be so laid across the plank, that the distance, $M L$, between the points, M , L , where their edges meet, be equal to the length of the trail, and from the points, M , L , perpendiculars, $M N$, $L O$, to $M L$, be also erected, equal each to the height of the trail, the right lines, $C N$, $N O$, and $D M$, being drawn, will, with the right lines, $A B$, $B C$, and $A D$, give the figure, $A B C N O P M D A$, of the cheek required.				
		Hinges	-	-	2					
Locker	-	-	-	-	1					
Draught-rings with bolts and burs	{	Hasp with staple	-	-	2					
		Trail	-	-	2					
Locking plates	-	-	-	-	2					
Lashing-rings with loops	-	-	-	-	8					
Nails	{	Rose-buds	-	-	4					
		Diamond-headed	-	-	8					
		Counter-funk	-	-	0					
		Trail	-	-	26					
Pintle-plates	-	-	-	-	2					

The names and numbers of the parts and irons of a travelling carriage-wheel are the following.

Nave	-	-	-	-	1
Spokes	-	-	-	-	12
Felloes, or fellies	-	-	-	-	6
Dowel-pins	-	-	-	-	6
Streaks	-	-	-	-	6
Streak-nails	-	-	-	-	48
Nave-boxes	-	-	-	-	2
Nave-hoops	-	-	-	-	3
Dowledges	-	-	-	-	6
Rivets for ditto	-	-	-	-	24
Nave hoop-flubs	-	-	-	-	9
Box-pins	-	-	-	-	6

The dowel-pins are wooden pegs about three inches long each, and three quarters of an inch in diameter. They serve for joining or fastening the felloes together.

The dowledges are iron plates, which are funk into the felloes on the outside, and are each of them fastened to the same with four pins, or rivets. They serve to fasten the felloes strongly together, and to strengthen the joints.

The nave is almost always made of elm, cut six months before it is used, and left all that time in the bark. Larch, however, would probably be found on trial to answer full as well, if not much better. The spokes are made of elm, or young oak, as dry and well seasoned as possible. The felloes are for the most part also of elm, but are sometimes made of split beech, which makes to the full as good, if not better ones. And the axle tree is generally made out of dry elm, young oak, or young beech. Swamp-maple is, however, much preferable for this purpose to either elm or beech.

The cheeks and transoms are always made of dry elm. But either young oak, or swamp-maple, are preferable to it for both.

The names and the numbers of irons, or pieces of iron-work in the axle-tree of a travelling-carriage, are the following.

Axle-tree bar	-	-	-	-	1
Clouts	{	Body	-	-	2
		Linch	-	-	2
Axle-tree hoops	{	Linch	-	-	2
		Arms	-	-	2
		Body	-	-	2

The usual construction of travelling-carriages is the following. See *fig. 11*.
Let $A b c d$ be the plank, out of which one of the cheeks is to be made, and let $A B$ be the height of the said cheek before. Set off from B to C the sum of the said height, or of the head, $A B$, and the distance from the hind part of the trunnions to the extremity of the calcable. Then, from the point, A , as a centre with the radius, $A C$, describe an arc, in which, as a chord, apply a right line, $C D$, equal to the height of the cheek at the centre, and draw the right lines, $A D$, $B C$. On $B C$, take $B E$, equal to the head, $A B$, or height of the cheek before, and from the point, E , set off towards B the right lines, $E r$, $r S$, equal each to half the diameter of one of the trunnions. Then, $E S$ being equal to the diameter of the trunnion, cut the trunnion-hole out of the cheek, so that its centre may be about a quarter of an inch below the line, $B C$, or $E S$. From the point, r , draw the right line, $r F$, perpendicular to $A D$, or parallel to $A B$, and in $A D$, take $F H$, equal to the breadth of the axle-tree, which is funk or let in about an inch into the cheeks. On the right line, $F H$, constitute a square, and from I , the point of intersection of its diagonals, as a centre with a radius of 29 inches, which is equal to the radius of the wheel, describe an arc. This arc will represent a part of the wheel; and if a ruler touching the said arc be so laid across the plank, that the distance, $M L$, between the points, M , L , where their edges meet, be equal to the length of the trail, and from the points, M , L , perpendiculars, $M N$, $L O$, to $M L$, be also erected, equal each to the height of the trail, the right lines, $C N$, $N O$, and $D M$, being drawn, will, with the right lines, $A B$, $B C$, and $A D$, give the figure, $A B C N O P M D A$, of the cheek required.

The lower part, $M P$, of the trail is rounded in order that the carriage may slide with more ease on the ground, or on a platform, which rounding is formed by first dividing $L O$ into four equal parts, and taking $L P$ equal to one of them; secondly, by erecting right lines at the points, M , P , perpendicular respectively to $D M$, $M P$, and meeting in the point Q ; and lastly, by bisecting $M Q$ in the point, R , and from R , as a centre with the radius, $R M$, describing the arc, $M P$.

The mortise, V , of the centre-transom is ascertained or determined by drawing a right line through the point, C , perpendicular to the horizon, $K M$, in which $C p$ is taken equal to a fourth part of the shot's diameter, and $p q$ equal to twice that diameter for its height. Its breadth, $p x$, taken in a right line, $p z$, parallel to $K M$, is equal to one diameter of the shot. The distance between the centre-transom, V , and the bed-transom, X , is equal to two diameters of the shot; and the height and breadth of this last are each equal to one diameter. The breast-transom, Y , is one diameter of the shot broad and two high. The sides of it are parallel to the head, $A B$, and terminate above, or at top in a right line parallel to $B E$, and equally distant from it with the bottom of the trunnion-hole. And the inside one of them, if produced, would pass through the point at the side of the said hole, that is next to the head, $A B$. The mortise of the trail-transom is equal in length to the trail itself; its height is equal to one diameter of the shot,

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and it is parallel to the upper side, NO, of the trail. Its lower side, if produced, would pass through the point, P.

All these mortises, viz. of the breast-transom, the bed-transom, the centre-transom, and the trail-transom, are divided by horizontal right lines into four equal parts, the upper one of which is sunk or let in half an inch into each of the cheeks, the two middle ones to the depth of two-thirds of the thickness of one of the cheeks, and the lower one not at all.

And the following is the construction of the plan of a travelling gun carriage. See *fig. 12*.

Draw any indefinite right line, AB. In it take the right line, CD, equal to the distance from the centre of the trunnions to the extremity of the base-ring of the gun. Through the points C, D, draw right lines perpendicular to AB, and let them be produced indefinitely. On that drawn through the point C, take CE, CF, contrary ways and equal each to the radius of the second reinforce-ring. And on that drawn through the point D, take DK, DL, also contrary ways, and equal each to the radius of the base-ring. Then right lines drawn through the points F, L, and E, K, will determine or ascertain the width of the carriage within; and if two right lines be drawn parallel to these, and at a distance from them respectively equal to the length of either of the trunnions they will give the equal thicknesses of the cheeks QP, RS.

The positions of the trunnion-holes m, n, are ascertained by setting off a distance both from the point E, and the point F, equal to half the diameter of either of the trunnions. The breast-transom, Y, must be drawn with a breadth equal to one diameter of the shot, and with its inside in a line with the fore parts of the trunnion-holes. Take CA equal to CB in the last figure. Then a right line, RAQ, perpendicular to AB, will determine the breast of the carriage; and its total length is ascertained by the immediately preceding figure.

If two diameters be set off from the right line KL, we shall get the hind part of the centre-transom, V, the width or breadth of which as well as that of the bed-transom is equal to one diameter of the shot. The distance between these is equal to two diameters, and the position and breadth of the trail-transom are determined as in the immediately preceding figure. In the middle of this transom is the pintle-hole, of an oval form, wider above than below, in order that the pintle may have room to play in it when the carriage is moving on or going over uneven ground. The bed, w, is a piece of an inch and half-board one foot broad and is sunk or let down into the bed and centre-transoms. The plane of the fore-part of the axle-tree would, if produced, pass through the centres of the trunnion-holes. There is a board fixed with one end on the axle-tree and the other on the bed-transom, for laying hay, straw, &c. upon for wadding. From about one diameter and a half from the centre-transom, to about a diameter from the trail, the breadth or thickness of each of the cheeks is diminished by a sixth part of the same.

This is the construction that has been commonly observed and made use of for travelling carriages. But Mr. Muller has given a general construction for them to suit his construction of guns, the lengths of which he supposes to be respectively equal to 20 or 21 diameters of their shot.

The general dimensions of travelling gun-carriages, according to this construction, are the following. See *fig. 11*.

The length, Ad, of the plank is equal to seven feet and a half together with twelve diameters of the gun's shot. The height, AB, of each of the cheeks is equal to three diameters and a quarter. Bb is equal to half a diameter,

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and the height, DC, at the centre is equal to 70 such equal parts as those, of which the said diameter contains 24. The length of the trail is equal to three diameters, and its height, MN, to two. The breadth, FH, of the axle-tree is equal to two diameters, and the rest of the dimensions are regulated by the size of the gun.

The following is his construction of travelling carriages for such guns. See *fig. 11*.

Make the length, Ad, of the plank for either cheek of the carriage equal to seven feet and a half together with 10 diameters of the shot of the gun; its height, Ab, equal to three diameters and three quarters of a diameter; and the height, AB, of the cheek itself equal to three diameters and a quarter. Take BC equal to eight diameters, together with 20 such parts as those, of which one diameter of the shot contains 24; from the point, A, as centre with the radius, AC, describe an arc, in which apply as a chord CD, equal to 70 such parts, and draw the right lines AD, BC. On BC set off BE equal to the head AB, or the height of the cheek, and from the point, E, set off towards the point, B, the right lines, Er, rS, equal each to nine such parts, making ES equal to 18 such parts or the width of the trunnion-hole, of which the centre is about a quarter of an inch below BC or the upper surface of the cheek. From the point r, draw the right line rF, perpendicular to AD, and on AD take FH equal to 30 such parts for the breadth of the axle-tree, which is let in or sunk into the cheek about an inch. On FH constitute a square, and from the intersection, I, of its diagonals as centre with a radius of 29 inches describe an arc, which will represent a part of one of the wheels. Apply a straight ruler touching this arc so to the said plank that the distance ML, between the points, M, L, where its edge coincides with the edges of the plank, may be equal to three diameters, and from these points draw MN, LO, perpendicular to KM, and equal each of them to two diameters. Then if the right lines CN, NO, and DM, be drawn and the under part of the trail be described as above pointed out from R, the bisecting point of the right line, MQ, as a centre, we shall have ABCNOPMDA for the outline of the cheek.

And the construction of the plan of such a carriage is as follows. See *fig. 12*.

Draw any indefinite right line, AB. In it take CD equal to seven diameters and 17 such parts. Through the points, C, D, draw right lines, EF, KL, at right angles to AB, making CE, CF, equal each of them to 27.5 such parts, and DK, DL, equal each of them to 32.5 such parts. Then right lines drawn through the points F, L, and E, K, will determine or ascertain the width of the carriage on the inside. And if parallel to these lines two other right lines be drawn at the distance from them respectively of 18 such parts, we shall have the thicknesses of the cheeks and the outside width of the carriage.

The positions, m, n, of the trunnion-holes are determined by setting off on both sides of the points, E, F, nine such parts for the radius of each of the trunnions. And if Ca be taken equal to CB in the last *fig.* or *fig. 11*, the line, RQ, drawn at right angles to AB, will determine the breast of the carriage; and its total length, a I, is ascertained from the said figure. The other parts of the construction are the same as those above.

Figure 13. is the elevation of a six-pounder travelling carriage with the irons marked on it, and figure 14. is the plan of the same.

Field-carriages are shorter and much lighter than those above mentioned, and described, being in these respects pro-

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portioned to the weights and lengths of the pieces mounted on them. They are nearly in the same form, however, but have their wheels eight inches lower, which reduction of height makes them perhaps lower than they ought to be.

Their dimensions are the following :

Calibers or natures of the guns		Pounder 24	Pounder 12	Pounder 6
		Inches and Dec- imals.	Inches and Dec- imals.	Inches and Dec- imals.
Plank	Length - - -	108.0	106.0	94.0
	Height - - -	15.6	14.0	12.4
	Thickness - - -	14.5	3.7	3.0
Cheeks	Height before - - -	14.5	12.7	11.0
	Ditto at the centre - - -	12.0	10.9	9.8
	Ditto at the trail - - -	10.0	9.2	8.4
Length of the trail - - -		11.0	10.5	10.0
Length from head to centre - - -		50.0	45.0	40.0
Width within	Before - - -	11.5	10.7	10.0
	Behind - - -	17.0	15.0	13.0
Lockers	Length - - -			23.0
	Breadth - - -			13.3
	Depth - - -			4.3
Length of the trail hand-spike - - -		63.0	60.0	57.0
Diameter of ditto at the trail - - -		4.0	3.5	3.0
Elevation	Handles in length - - -		5.0	4.0
	Height - - -		10.5	9.0
	Diameter - - -		2.0	1.5
	Diameter of socket - - -		3.0	2.5
Wheel - - Height - - -		50.0	50.0	50.0
Length of each nave - - -		15.0	13.0	12.7
Diameter of ditto	Body - - -	13.0	11.0	10.6
	Middle - - -	14.0	12.0	11.6
	Linch - - -	12.0	11.0	10.0
Felloes	Height - - -	4.7	4.0	3.6
	Breadth - - -	3.3	2.8	2.4
Spokes	Breadth - - -	2.0	1.8	1.7
	Thickness - - -	3.5	3.2	2.9
Length of axle-tree - - -		75.0	72.0	73.4
Body	Length - - -	39.0	40.0	42.0
	Breadth - - -	6.0	5.5	5.0
	Height - - -	8.0	7.0	6.0
Length of each arm - - -		18.0	16.0	15.7
Diameters	Body - - -	6.0	5.5	5.0
	Linch - - -	4.0	3.0	3.5

The length of the plank for either cheek in one of these carriages is equal to four feet, together with thirteen diameters of the shot. And the width within varies with the thickness of the metal in the piece.

The construction for travelling carriages answers likewise for field carriages, if these dimensions be made use of instead of those delivered above. See *figs. 15 and 16*. The latter, however, differ from the former in the following particulars.

They have no bed-transoms, as screws, instead of wedges, are made use of for elevating or depressing them; for which reason the centre transom in each of them is two diameters broad, and but one thick, and is so placed in the middle of the height of the cheeks, that the neck of the cascable answers to the middle of the breadth of the transom, where the screw is fixed.

On each side of one of these carriages there is a box or locker, about twenty-three inches, or two feet long, with its upper surface even with, or rather about an inch above the upper part of the axle-tree, and extending from thence towards the trail. These boxes, or lockers, serve for carrying shot on a march, and are covered each of them by another box holding cartridges, which slides on and is fastened with a bolt.

The iron-work in one of these carriages is nearly the same as that in a travelling carriage, but not quite so strong. It has only one garnish-bolt, and no garnish-nails. The eye-bolt next to the joint-bolt passes through the axle-tree band behind and not before as in other carriages, and the fore part of this band is only fastened by the fore eye-bolt. The draught-hooks are fixed sometimes to the breast-transom plates, and sometimes to the axle-tree. But the nearer they are fixed on a level with the breasts of the horses the better. There are sometimes hooks to the trail transom-plates, and sometimes nails about four inches long. The washers have also hooks, to which are fastened the ropes, by which the gunners or their assistants drag the gun along.

A galloper-carriage is for a pound and a half gun. *Fig. 19* is an elevation of one, and *fig. 20* a plan of one. The following are its dimensions.

	Fect	Inches
Total length of each shaft - - -	11	0.27
From the fore end to the fore cross-bar - - -	6	4.16
From the hind end to the round part - - -	5	0.11
Height at the hind end - - -	0	6.0
Height at the fore end - - -	0	3.0
Breadth behind and before - - -	0	3.5
Breadth in the middle - - -	0	4.5
Inside width behind - - -	2	6.5
Do. at the fore cross-bar - - -	2	4.0
Do. at the fore end - - -	2	1.0
From the hind end to the axle-tree - - -	0	11.0
Cross bar from the hind end - - -	0	3.12
Length of each cheek - - -	4	2.11
Breadth of do. - - -	0	2.5
Height of do. - - -	0	6.5
Inside width before - - -	0	8.0
Do. behind - - -	0	11.5
Total length of the axle-tree - - -	6	4.18
Length of the body of do. - - -	3	6.5
Length of each arm - - -	1	4.84
Breadth of the body - - -	0	5.0
Height of do. - - -	0	6.0
Greatest diameter of each arm - - -	0	5.0
Least diameter of do. - - -	0	3.3
Diameter of each wheel - - -	4	3.13
Length of the nave - - -	1	1.0
Diameter of the body of do. - - -	0	11.0
Diameter of the middle of do. - - -	1	0.0
Do. of the linch of do. - - -	0	10.0
Breadth of each spoke - - -	0	1.5
Thickness of do. - - -	0	3.0
Breadth of each felloe - - -	0	3.0
Thickness of do. - - -	0	4.5

The rest of the dimensions not inserted here may be taken from the draughts, *fig. 19 and 20*. A galloper-carriage is made with shafts to be drawn, as we have already observed, without a limber.

The dimensions of limbers both for travelling and field-carriages are the same, and are the following.

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Nature of the guns.	Pounder. 24	Pounder. 12	Pounder. 0	Pounder. 3
Diameter of each wheel	48	48	48	48
Length of the nave	16	15	14	10
Diameter of the body of do.	13.5	13.5	12	12
Do. of the middle of do.	14.0	14.0	13.0	12.5
Do. of the lynch of do.	12.0	12.0	11.0	10.0
Breadth of each felloe	4.5	4.0	3.5	3.0
Height of do.	5.0	4.5	4.0	3.5
Breadth of each spoke	1.8	1.6	1.4	1.2
Thicknefs of do.	4.0	3.5	3.0	2.5
The length of the axle-tree	78	76	74	69
Length of the body of do.	40	40	40	43
Height of the body of do.	7.6	7.0	6.0	5.5
Breadth of the body of do.	6.0	5.5	5.0	5.0
Length of each arm of do.	19	18	17	13
Diameter of the body of do.	5	4	4	4
Do. of the lynch of do.	4	3	3	3
The length of each shaft	94	94	94	94
Breadth of hind end of do.	6	5.5	5	4
Do. of fore end of do.	3	3	2.5	2.5
Height of hind end of do.	3.5	3	3	3
Do. of fore end of do.	3	3	2.5	2.5
Length of the beams	110	110	110	110
Breadth of do. at hind end	4.5	4.0	3.5	3.0
Do. of do. at fore end	4.0	3.5	3.0	2.5
The height of the bolster	12.5	10.0	8.0	7.0
The length of do.	40	40	40	43
The breadth of do.	6	5.5	5.0	5.0
Breadth of the fore cross-bar	4.5	4.0	3.5	3.0
The height of do.	1.5	1.5	1.5	1.5
Breadth of hind cross-bar	3.5	3.5	3.5	3.0
The height of do.	1.5	1.5	1.5	1.5
Distance of axle-tree from the fore cross-bar	11.5	11.5	11.5	11.5

The shafts of limbers are about two feet open before, two feet ten inches in the middle, and a little less near the axle-tree according as the wood, out of which they are made, happens to be more or less crooked. For it ought never to be cut across the grain for fear of weakening it too much. The height of the bolster diminishes towards both ends, as in *fig. 22*. That given in the immediately preceding table is for the middle of it.

The following are the names of the irons, or pieces of iron-work in the shafts and beams of limbers with the number of each. See *fig. 21, 22, and 23*.

a. Limber-bolt	-	-	-	1
b. Shaft-rings	-	-	-	2
c. Shaft-pins with chains	-	-	-	2
d. Breech-hooks	-	-	-	2
e. Ridge-chain with hook and loop	-	-	-	1
f. Limber-chain with hook and rings	-	-	-	1
g. Single fore lock keys	-	-	-	4
h. Diamond-headed nails	-	-	-	8
i. Dog-nails	-	-	-	6
l. Bolster-hoops	-	-	-	2
m. The pintle	-	-	-	1
n. The pintle-washers	-	-	-	2
Stubs for bolster-hoops	-	-	-	8

The irons, or pieces of iron-work in the wheels and axle-tree are the same in form and number as those men-

tioned above, but somewhat lighter and smaller, and need not therefore be specified.

Howitzer-carriages are for mounting and transporting howitzers on. Those for the 6 and 5.8 inch howitzers are made with screws for elevating or depressing them in the same manner as the light six pounders are elevated or depressed. For this reason they are made without a bed, and the centre-transom in each of these is nine inches broad, for fixing the screw on instead of four, the breadth of it in those that are without screws. In them that is also between the trail and centre-transom, a transom-bolt, which is not in others, because the centre-transom must be so made as to be taken out in order that the howitzer may be elevated to any angle under 90 degrees.

The iron-work of a howitzer-carriage is the same as that of a field-carriage, with this exception, that in it there are only four garnish nails, viz. two of a side, because it is so short as not to admit of more. The wheels and axle-tree are the same as those of an 18 and 12 pounder-carriage.

The following are the dimensions of an eight-inch howitzer-carriage.

	Feet	Inch.
The length of each cheek	8	5
The thicknefs of do.	0	4.5
The height of do. before	1	6
Do. of do. at the centre	1	4
Do. of do. at the trail	1	2
Length of the trail	1	3
Height of the plank	1	6
Distance from the head to the centre	3	7
Do. of trunnions from the head	0	9
Breast-transom { Length	1	2.5
Height	0	2
Thicknefs	0	4.5
Centre-transom { Length	1	4.5
Height	0	2.5
Thicknefs	0	4.5
Trail-transom { Length	1	7
Breadth	1	3
Thicknefs	0	4.5

Of mortar-beds.

A mortar-bed answers for mounting a mortar on as a gun carriage does for mounting a cannon on. Land mortar-beds are commonly made solid, each of them consisting of four pieces of timber well secured and strongly fastened together with iron-work, except those for royals and coehorns, each of which is made out of a single block.

Bores of the mortars and na- tures of the beds	13 Inch	10 Inch	8 Inch	5.8 Inch	4.6 Inch
	Inch.	Inch.	Inch.	Inch.	Inch.
Lower bed { Length	84	66	50	0	0
Breadth	33	26	20	0	0
Height	13	10	9	0	0
Upper bed { Length	83	65	49	31.5	28.5
Breadth	32	25	19	16	14
Height	13	12	11	10	9
Breadth of quarter round	3	2.5	2.5	0	0
Do. of the ogge and fillet	4	3.5	3	0	0
The length of the cavity	20	16	12	8	5.7
Distance of the trunnion-holes from the fore end	31	20	15.5	13.3	11.7
The diameter of the trunnion- holes	7.2	6.4	5.4	3.4	2.4
The depth of the trunnion- holes	7	6	5	3.2	2.2

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The distance of the trunnion-holes is measured from the quarter round, and not from the very end of the bed. The joint of the two pieces of the upper bed of a 13, 10 and 8 inch mortar-bed is so contrived as not to be directly over the joint of the two pieces in the lower bed.

The following are the names and numbers of the irons in a 13, 10, or 8 inch mortar bed. See *fig. 24, 25, 26, and 27.*

a. Cap-squares	-	-	-	-	2
b. Eye-bolts	-	-	-	-	2
c. Joint-bolts	-	-	-	-	2
d. Under and upper bed-bolts	-	-	-	-	9
e. Dowel-bars	-	-	-	-	4
g. Rings with bolts	-	-	-	-	4
h. Reserve-bars	-	-	-	-	2
k. End rivetting plates	-	-	-	-	2
l. Middle plate	-	-	-	-	1
m. Rivetting bolts	-	-	-	-	6
n. Square rivetting bolts	-	-	-	-	12
p. Traversing bolts	-	-	-	-	6
q. Keys, chains, and staples	-	-	-	-	2
Names and numbers of irons in a royal or coehorn bed.					
a. Cap-squares	-	-	-	-	2
b. Eye-bolts	-	-	-	-	2
c. Joint-bolts	-	-	-	-	2
d. Rivetting bolt with ring	-	-	-	-	1
f. Handles with starts	-	-	-	-	2
g. Square rivetting plates	-	-	-	-	5
h. Keys, chains, and staples	-	-	-	-	2

Mr. Muller gives the following dimensions for mortar beds to suit his general construction of three kinds of mortars, supposing, as in his construction of them, the diameter of

the bore to be always divided into thirty equal parts, as a scale to go by.

Diameter of the bore in } each kind divided into		30 equal parts.	30 equal parts.	30 equal parts.
		Parts of the diameter. Diameter of the bore.	Parts of the diameter. Diameter of the bore.	Parts of the diameter. Diameter of the bore.
Lower bed	Length	6 0	5 10	4 25
	Breadth	2 10	2 2	1 26
	Thickness	0 28	0 25	0 22.5
Upper bed	Length	5 28	5 8	4 23
	Breadth	2 8	2 0	1 24
	Thickness	0 28	0 25	0 22.5
The breadth of the ogee		0 6	0 5	0 4.5
The breadth of the quarter round the fillet		0 6	0 5	0 4.5
The diameter of each of the trunnion holes		0 14	0 13	0 12
The depth of each of the trunnion holes		0 10	0 9.5	0 9
The interval between them		1 5	1 5	1 4
The length of each of them		0 15	0 14	0 13

The dimensions of the first of these kinds of mortar beds correspond nearly to those of the mortar beds that have been generally in use.

The general dimensions of the iron work for such beds are the following:

		Parts of the diameter divided into 30. Diameter of the bore.	Parts of the diameter divided into 30. Diameter of the bore.	Parts of the diameter divided into 30. Diameter of the bore.
Of each cap square	Length	1 18	1 14	1 9
	Breadth	0 12	0 10	0 8
	Thickness	0 3	0 2.5	0 2
Fore end from the trunnion-hole		0 16	0 14	0 13
Of each eye-bolt-head	Height	0 8	0 7	0 6
	Breadth	0 7	0 6	0 5
	Thickness	0 3.5	0 3.5	0 3
The diameter of each joint bolt head		0 11	0 8.5	0 7.5
The thickness of ditto		0 3.5	0 3.5	0 3
Distance from the trunnion-hole		0 10.5	0 9.5	0 7.5
The length of each traversing-bolt		0 23	0 20	0 16
The diameter of the head of ditto		0 4.5	0 3.5	0 3
The diameter of the bolt itself		0 3	0 2	0 2
The distance from the end		1 2	0 29	0 24
Its distance from below		0 12	0 11	0 10
Of the middle plate	Length	2 8	2 0	1 24
	Breadth	0 9	0 7	0 6
	Thickness	0 1.6	0 1.5	0 1.5
The length of the bed-bolt		2 10	2 2	1 26
The diameter of ditto		0 3	0 2.5	0 2
The diameter of the ring		0 14	0 12	0 10
The thickness of the ring		0 3	0 2.5	0 2

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		Parts of the diameter divided into 30. Diameters of the bore.	Parts of the diameter divided into 30. Diameters of the bore.	Parts of the diameter divided into 30. Diameters of the bore.
The diameter of each rivetting bolt	-	0 3	0 2.5	0 2
The diameter of the ring of ditto	-	0 3	0 2.5	0 2
Distance from the ends of the plates	-	0 6	0 5	0 4
Diameter of the bed bolts burs	-	0 6	0 5	0 4
Rivetting plates { Length	-	1 27	1 19	1 14
{ Breadth	-	0 8	0 6	0 5
{ Thickness	-	0 1	0 1	0 1
From the quarter-round	-	0 8	0 6	0 5
Diameter of the traversing bolt-plates	-	0 11	0 10	0 10

He supposes these mortars, contrary to what has been the common practice, to be to placed in their beds as to be moveable, and capable of being raised from an angle of 10 degrees to any under 90, and also the cavity in each bed to be to made as to receive the wedges for raising the mortar with.

Sea-Mortar-beds are likewise made solid with very strong timbers but differ from the land-mortar-beds in point of form or figure, and have each of them a hole in the middle, or centre, for receiving the pintle-pin, or strong iron bolt, round which the bed may turn. They are placed on strong wooden frames fixed into the bomb ketches, to which the pintles are fastened. The fore-part of a sea-mortar-bed is an arc of a circle described from the centre of the pintle-hole.

The following are their dimensions in inches. See *fig.*

28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38 and 39.

Diameters of the bores	13 inch	10 inch
	inches.	inches.
The lengths of the beds	94	84
The breadths of the beds	54	47
The heights of the beds	27	23
Distances of the pintle-holes from the fore-ends	39	32
Diameters of the pintle-holes	6.5	6.5
Distances of the trunnions from the fore-ends	46	42.5
Diameters of the trunnion-holes	10	8
Depths of the trunnion-holes	8	5
Diameters of the circular beds	59	59
Heights of the circular beds	8	6
Distances to the bed bolsters	16	15
Depths of the cavities	15	12
Their openings above	30	21
The lengths of the bed-bolsters	53	44
Their lengths below	29	22.1
Their breadths	14	12

And the names and numbers of the irons in both the 13-inch mortar-bed and 10-inch mortar-bed are the following.

a. Cap-squares	-	2
b. Eye-bolts	-	6
c. Loop-bolts	-	4
d. Traversing-bolts	-	4
e. Middle-plate	-	1
f. Rivetting-plate	-	1
g. Rivetting bolts	-	6

b. Cross-bed bolts	-	7
l. Square rivetting plates for ditto	-	7
k. Down bed-bolts	-	15
m. Bed-bolster plates	-	2
Keys, chains and staples	-	6
Nails to the bed-bolster bed	-	4
Bed bolster rings with loops	-	2

Tumbrels, as we have already observed, are carriages with two wheels, only are commonly made use of for carrying tools for miners, artificers, and pioneers, and sometimes the money of the army. The dimensions of one are the following. See *fig.* 40 and 41.

The diameter of each wheel	-	60
The length of the nave	-	15
The diameter of the body of ditto	-	12
Ditto of middle of ditto	-	13
Ditto of lynch of ditto	-	10
The breadth of each spoke	-	2.2
The thickness of ditto	-	3.3
The breadth of each of the felloes	-	4.5
The thickness of ditto	-	3.5
The length of the axle-tree	-	76
The length of the body of ditto	-	42
The breadth of ditto of ditto	-	5
The height of ditto of ditto	-	6.7
The length of each arm	-	17
The diameter of the body of ditto	-	4.5
Ditto of the lynch of ditto	-	3
The total length of each shaft	-	147
The distance from the hind end of each to the cross-bar	-	7
Ditto from the hind cross-bar to the fore end	-	62
Distance from the fore-cut to the fore-end	-	78
The breadth of ditto behind	-	4
Ditto of ditto at the fore-cut	-	4.5
Ditto of ditto in the middle	-	3.5
Ditto of ditto at the fore-end	-	2.3
Height of ditto from the hind end to the fore-cut	-	3.5
Ditto of ditto at the fore-end	-	2.3
Inside width behind and at the fore-cut	-	34
Ditto in the middle	-	35
Ditto at the fore end	-	25
Cross-bars { Breadth	-	3.5
{ Thickness	-	2
{ Length	-	31

Fore-cut

CARRIAGE.

		Inches.		Inches.
Fore-cut	Length	51	The breadth of the bolster	7
	Breadth	4	The height of ditto	8
	Thickness	2	The length of each side-piece	132
Raves	Length	62	The breadth of ditto	6.5
	Breadth	2	The height of ditto	6.5
	Thickness	3	The distance between the axle-trees	72
Standards	Length	24	The side pieces project equally by	24
	Breadth	2.8	The length of each shaft	96
	Thickness	1.3	The breadth of each behind	5.3
Head-bars	Length	36	The breadth of each in the middle	6
	Breadth	1.2	The breadth of each before	3
	Thickness	1.8	The length of the straight bar	19
Uprights	Length	22	The opening behind	28.5
	Breadth	1.3	Ditto in the middle	32.5
	Thickness	3	Ditto before	24
And the following are the irons in one of them.			The height of each shaft	3
The irons of a pair of wheels and axle-tree complete.			The length of the rider	46
Axle tree pins with rings and keys			The breadth of the rider	6.5
Fore-cut pins			The height of ditto	8
Breech-hooks			The interval between the side pieces	12
Shaft-rings			The side pieces are let into the rider and hind bolster	2
Shaft-pins with chains and staples			And the irons in such a carriage are the following.	
Ridge chain with hook and loop			Irons complete for wheels, axle-tree, and shafts.	
Bail staples			No	

Block-carriages, as we have observed above, are chiefly for conveying mortars and their beds from one place to another.

The dimensions of one of them are the following. See fig. 42, 43, and 44.

	Inches.		No
The height of each fore-wheel	48	Iron bar for fastening the hind axle-tree to the fore one	1
The length of the nave	15	Bolts for fixing this bar to the axle-trees	2
The diameter of the body of ditto	14	Bolster-bolts	4
Ditto of the middle of ditto	15	Hooks fastened to the side-pieces with two bolts and bars	4
Ditto of the lynch of ditto	13	Bar for fastening the side pieces to the middle	1
The height of each felloe	5.5	Staples for the shafts and iron bands with loops	2
The breadth of ditto	3.5	Loops, one fastened to the rider, and another to the hind bolster	2
The breadth of each spoke	2	The principal use of a <i>truck carriage</i> , as we have already observed, is to carry timber and other heavy articles from one place to another, and sometimes guns and mortars, where their own carriages cannot go.	
The thickness of ditto	3	The following are the dimensions of one. See fig. 45, 46, 47, and 48.	
The height of each hind-wheel	60		
The length of its nave	17		
The diameter of the body of ditto	14		
The diameter of the middle of ditto	15		
The diameter of the lynch of ditto	13		
The height of each of its felloes	6.5		
The breadth of each felloe	4		
The breadth of each of its spokes	4		
The thickness of each of its spokes	2.3		
The total length of the fore axle-tree	77		
The length of its body	39		
The breadth of its body	6.5		
The height of its body	8		
The length of each of its arms	19		
The diameter of the body of each of ditto	6		
The diameter of the lynch of each	4		
The length of the bolster	49		
The breadth of the bolster	6.5		
The height of ditto	7		
The total length of the hind axle-tree	77		
The length of the body of ditto	37		
The breadth of the body of ditto	7		
The height of the body of ditto	8.7		
The length of each arm of ditto	20		
The diameter of the body of each of ditto	6		
The diameter of the lynch of ditto	4.8		
The length of the bolster	47		

Distance

CARRIAGE.

	Inches.		Inches.
Distance from the end to the straight cross-box	12	The height of do.	4
Fore-guide	<div> <div>Length</div> <div>Breadth</div> <div>Height</div> <div>Interval</div> </div>	The breadth of each spoke	1.7
		The thickness of do.	3
		The height of each hind-wheel	64
		The length of its nave	14
The diameter of each truck	25	The diameter of the body of do.	12
The thickness of each truck	4	The diameter of the middle of do.	13
The breadth of the cross-piece fixed to the fore end of the side-pieces	5	The diameter of the lynch of do.	9
The height of do. before	3	The breadth of each felloe	4
The height of do. behind	1.5	The height of do.	3
The breadth of the cross-piece under the side-pieces behind the fore-bolster	10	The breadth of each spoke	1.7
The thickness of do.	1.5	The thickness of do.	3
The plan and elevation of the carriage shew the iron-work sufficiently.		The total length of the fore axle-tree	76
The following are the dimensions of a <i>ponton</i> , or <i>ponton carriage</i> .		The total length of the hind axle-tree	76
The diameter of each wheel both behind and before	63	The length of the body of each	42
The length of each nave	15	The breadth of the body of each	6
The diameter of the body of do.	14	The height of the body of each	7
The diameter of the middle of do.	15	The length of each arm of each	17
The diameter of the lynch of do.	12	The diameter of the body of do.	5
The breadth of each felloe	4	The diameter of the lynch of do.	3
The height of do.	4.5	The total length of each shaft with the side	203
The breadth of each spoke	2	The breadth of do. behind	4
The thickness of do.	3.5	The breadth of do. in the middle	4.5
The length of each axle-tree	86	The breadth of do. before	2.8
The length of the body of do.	46	The height of do. behind	3
The breadth of the body of do.	6	The height of do. in the middle	2.8
The height of the body of do.	8.5	The height of do. before	2
The length of each arm of do.	18	The opening between them before	25
The diameter of the body of each arm	6	Ditto in the middle	35
The diameter of the lynch of do.	3.8	Ditto behind	30
The length of each of the under side-pieces	210	The length of each nave	124
The breadth of do.	7	The breadth of do.	3
The height of do.	6	The height of do.	6
The length of each of the upper side-pieces	206	The length of each upright	27
The breadth of do.	5	The breadth of do.	3
The height of do.	2.6	The thickness of do.	2.2
Of the fore and hind cross-bars	<div> <div>Breadth</div> <div>Height</div> <div>Length</div> </div>	The breadth of the fore cross-bar	3
		The thickness of do.	2.2
		The breadth of the hind cross-bar	2
The distance of the centre of the fore axle-tree from the fore end	10	The thickness of do.	2.2
The distance of the centre of the hind axle-tree from the hind-end	9.3	Distance from the fore end to the fore axle-tree	23
Opening between the upper side-pieces	51	Distance from the hind end to the hind axle tree	14
Ditto between the under side-pieces	18	Distance between	74
The distance of the fore-supporter from the fore-end	45	An <i>ammunition-waggon</i> is an artillery carriage for carrying all sorts of military stores. It has four wheels, has its sides railed in with staves and raves, and is lined on the inside with basket or wicker-work. It carries 12 cwt. and is sometimes employed for carrying bread. Its dimensions are the following. See <i>fig. 49, 50, 51, and 52.</i>	
The distance of the hind-supporter from the hind-end	32	The height of each of the fore wheels	48
The height of each supporter	12	The length of its nave	13
The <i>artillery carriage</i> , commonly called a travelling forge, is the carriage of a sort of portable smith's shop, at which all kind of smith's work is done in camp, and even on a march. Formerly it used to have but two wheels, and had wooden supporters to prop up the forge for working at when in the park of artillery. But now it has usually four wheels, and is much more convenient.		The diameter of the body of do.	12
The dimensions of such a carriage are the following.		The diameter of the middle of do.	14
The height of each fore-wheel	104	The diameter of the lynch of do.	10
The length of its nave	14	The height of each felloe	4
The diameter of the body of do.	12	The breadth of do.	3
The diameter of the middle of do.	13	The breadth of each spoke	1.5
The diameter of the lynch of do.	9	The thickness of do.	3
The breadth of each felloe	3	The height of each of the hind wheels	60
		The length of its nave	13
		The diameter of the body of do.	12
		The diameter of the middle of do.	14
		The diameter of the lynch of do.	10
		The breadth of each of its felloes	3
		The height of each of do.	4
		The breadth of each spoke	1.8
		The thickness of do.	3.5
		The	The

C A R R I A G E.

	Inches.		Inches.		
The total length of the fore axle-tree	72	The breadth of do.	3.6		
The length of its body	40	The thickness of do.	3		
The breadth of its body	5	The length of the guide-bar	50		
The height or depth of its body	6	The breadth of do. in the middle	3		
The length of each of its arms	16	The breadth of do. at the end	1.5		
The diameter of the body of do.	5	The thickness	1.5		
The diameter of the linch of do.	3	The distance from the centre of one axle-tree to that of the other	89		
The total length of the hind axle-tree	70	The sommers reach {	beyond the fore axle-tree 10 beyond the hind 58		
The length of its body	38				
The breadth of its body	6.5	The iron-work of such a waggon.			
The height or depth of its body	6		No.		
The length of each of its arms	16	Pintle	1		
The diameter of the body of do.	5	Pole-pin	1		
The diameter of the linch of do.	3	Bolster-pins with keys	4		
The length of the fore-bolster	49	Locking-plates	2		
The breadth of do.	5	Bail staples	16		
The height or depth of do.	6	Sweep-bar pins	2		
The length of the hind-bolster	46	Shaft-bolt with key	1		
The breadth of do.	5	Swing-tree pins	2		
The height or depth of do.	6	Hooks for do.	2		
The length of the rider	49	Bars for fixing the swing-tree to the axle-tree	2		
The breadth of do.	5	Plate for the cross-bar of the fore-guide	1		
The height of do.	4.7	Washing-plates for the shafts	2		
Sommers and sides {	Length	Bolster bands	4		
	Breadth	Pole plate	1		
	Height				
The length of the pole	120	With irons complete for the shafts, axle-trees, and the wheels, the dowlages excepted.			
Its square before	4	<i>Powder carts, or carriages, are for carrying powder along with the army. Each of them is divided into four parts, by boards of an inch thick, which enter about an inch into the shafts. Only four barrels of powder are stowed in one of these carts. The roof of such a cart is covered with oil-cloth, to prevent dampness from getting to the powder, and its dimensions are the following: see figs. 53 and 54.</i>			
Its square behind	3		Inches.		
The length of the middle bar	40	The diameter of each wheel	65		
The breadth of do.	3.5	The total length of each side with its shaft	180		
The height or depth of do.	6.5	Distance from the hind end to the cross-bar	5.5		
Hind-guide {	Length to the axle-tree	Distance from the hind cross-bar to the fore cross-bar	88.5		
	Breadth at the head	Distance from the fore cross-bar to the fore-end	77.5		
	Square at the axle-tree	Breadth {	behind 3.3 at the fore cross-bar 4.4 in the middle 3.7 before 2.8		
	Opening at the axle-tree			Height {	behind 3 at the fore cross-bar 4 before 2.8
Fore-guide {	Length to the axle-tree				
	Breadth before				
	Breadth behind				
Thickness					
The length of the straight part	20	The opening behind and at the fore cross-bar	34		
The length from the axle-tree to the hind end	28	The opening at the middle	35		
Opening {	to receive the tongue	The opening before	25		
	near the axle-tree	Two shaft cross-bars {	Length of each 34 Breadth 2 Height 3		
behind	Under cross-bars {			Length of each 40 Breadth 3 Height 2	
					The length of each side piece
The length of the sweep-bar		50	The breadth of do.		13
The breadth of do.	3.5	The height of do.	3		
The height or depth of do.	2.5	Distance from the bottom, where the axle-tree passes through the side-pieces	3		
The length of each rave	14.4	Distance from the shafts to the beginning of the roof	6		
The breadth of do.	2.2	The height of the roof	12		
The height of do.	2.2	The length of the lids or sides	88		
The length of each flate flave	15.5	The breadth of do.	10		
The breadth of do.	2.5				
The thickness of do.	1				
The length of each shaft	67				
The length of the straight part	10				
The breadth {	behind				
	at the fore shaft bar				
	before				
The thickness before	3.2				
Opening {	at the shaft bolt				
	at the fore shaft-bar				
	in the middle				
	before				
The breadth of each shaft-bar	3				
The thickness of do.	2				
The length of the tongue	17				

C A R R I A G E.

	Inches.		Inches.
The thickness of do.	1	Of cheeks to support { the length below	60
The length of the roof-sides or lids	88	the rack-work { the length above	22
The breadth of do.	11	the height	20
The thickness of do.	1	the breadth	6
And the iron work is the following :	No.	The length of each shaft	94
a. Side bolts with screws	8	Breadth { behind	5.5
b. Cross bolts with single keys	2	in the middle	4
c. Double hinges for the short lids	6	before	3
d. Staples and keys with chains	4	Opening { behind	23
e. Hinges for roof-lids	2	middle	34
f. Hasps, staples, and keys for do.	3	before	25
g. Axle-tree pins with keys	2	Thickness of the shafts	3
With irons complete for shafts, wheels and axle-tree.		And the iron-work of it is as follows :	No.
A <i>sling waggon</i> is an artillery carriage for moving mortars		Cap-squares	2
and heavy guns, from one place to another, at no great		Eye-bolts	4
distance.		Trunnion plates	2
The following are the dimensions of one : see <i>figs.</i> 55, 56,		Beam hooks	2
57, and 58.		Iron to fasten the tooth-wheel	1
	Inches.	Rack-work with pland and handle	
Side-pieces { Length	15.2	Iron bar to stop the jack	1
Breadth	6	Bolts with screws to fasten the cheeks to the side-	
Height	7.8	pieces	8
Opening	3.2	Hind axle-tree stays with bolts	2
Exceed axle-tree	10	Cross-bar to fasten the side-pieces together	1
Interval between the centres of the axle-trees	123	Hooks fastened to the side-pieces with bolts and bars	4
The height of each fore-wheel	48	Bolster bolts with rings and keys	4
The length of its nave	14	Pintle with band and washer	1
The diameter of the body of do.	13	Bolster-hoops	4
Do. of the middle of do.	14	Iron-work complete for shafts and wheels	
Do. of the linch of do.	11	And the following are the dimensions of a <i>sling cart</i> : see	
The breadth of each of its felloes	3.8	<i>figs.</i> 59 and 60.	
The height of do.	5.5		Inches.
The breadth of each of its spokes	2.2	The height of each wheel	60
The thickness of do.	3.5	The length of its nave	15.5
The height of the hind-wheel	68	The diameter of the body of do.	14
The length of its nave	17	The diameter of the middle of do.	16
The diameter of the body of do.	16	The diameter of the linch of do.	12
Do. of the middle of do.	17	The breadth of each of its felloes	3.4
Do. of the linch of do.	13	The height of each of do	5.5
The breadth of each of its felloes	4.4	The breadth of each of its spokes	2
The height of do.	6	The thickness of each of do.	3
The breadth of each of its spokes	2.2	The length of the axle-tree	77.5
The thickness of do.	4	The length of its body	40.5
The length of the fore axle-tree	75.5	The breadth of do.	5
The length of the body of do.	41.5	The height of do.	5.5
The breadth of the body of do.	5	The length of each of its arms	18.5
The height of the body of do.	8	The diameter of the body of each	5
The length of each arm of do.	17	Do. of the linch of each	4
The diameter of the body of each arm	5	The total length of each shaft	168
Do. of the linch of do.	3	From the centre of the axle-tree to the fore end	144
The length of the hind axle-tree	81	Breadth of each from the hind end to the cross-bar	7
The length of the body of do.	41	Do. of do. in the middle	5.5
The breadth of do. of do.	5	Do. of do. at the fore end	3.4
The height of do. of do.	7	The height of each shaft	3.6
The length of each of its arms	20	The breadth of each cross-bar	4
The diameter of the body of each	5	The thickness of do.	2
The diameter of the linch of each	4		
The length of the fore bolster	41.5	Checks to support { length below	28
The breadth of do.	5	the roller { above	7
The height of do.	12	height	9
The length of the hind bolster	51	thickness	4
The breadth of do.	5	interval	32
The height of do.	11	Diameter of the roller	7
The length of the rider	54	From the centre of the axle-tree to the hind end	24
The breadth of do.	5	And its iron-work is the following :	No.
The height of do.	7.2	Cross bars	2

Round-headed nails to fasten the cross bars	-	4
Bolts with screws to fasten the cheeks	-	7
Iron-work complete for shafts and wheels.		

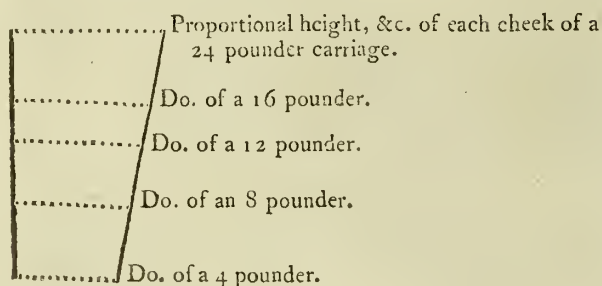
The French have been in the practice of using gun carriages on board their ships, or of having their *affuts de marins* with only two fore trucks, or roulettes pleines, to each, instead of ordinary wheels. These carriages do not recoil so much as those with four trucks, and are rather more easily pointed.

Their garrison carriages used to be constructed a good deal in the same manner. But the trucks were made considerably larger than those of their ship carriages, and consisted each of several pieces. They had also trails like travelling carriages, but much shorter.

Besides these, they have travelling carriages, or *affuts a rouage*. Each of these consists of two long cheeks of elm, rounded and shaped nearly as those of one of our own travelling carriages, and like them are fastened or joined together by means of four oak transoms, called by the French *entretoises*; the first of them, or breast transom, they call *entretoise de volée*; the second, *entretoise de touche*; the third, *entretoise de mire*; and the fourth, which runs the whole length of the trail, or of those parts of the cheeks that touch or rest on the ground, *entretoise de lunette*. When such a carriage with its gun is to be moved, a limber, or *avant train*, is fastened to the trail of it.

Fig. 61. is an elevation in profile of one cheek of the travelling carriage called l'assut du capitaine Espagnol, representing the relative dimensions of the different parts.

The figure that follows represents the relative or proportional heights or depths of the heads of the cheeks of carriages for the five calibers of 24, 16, 12, 8, and 4 pounders, according to the French ordinance or regulation of 1732.



CARRIAGE, in *Rural Economy*, in the practice of irrigation, a sort of conduit made of timber or brick; if of the latter, an arch is turned over the stream that runs under it, and the sides are bricked up; if of the former, which is commonly the case, it is constructed with a bottom and two sides, as wide and as high as the *main* it lies in. It must be made very strong, close, and well jointed. Its use is to convey the water in one *main* over another, which runs at right angles with it; its depth and breadth are of the same dimensions with the *main* it belongs to; its length in proportion to the breadth of the *main* it crosses. Wherever it is necessary, it is the most expensive conveyance belonging to the watering of land. See IRRIGATION, and WATERING OF LAND.

CARRIAGE Drain, a term applied to a furrow or trench, for the conveying of water to overflow and improve meadow land. Drains of this kind are distinguished into two sorts: the *main carriage*, which should be made with a convenient descent; and the *lesser carriage*, which should be shallow, and as many in number as possible. Much in the wa-

tering of land depends upon their being properly laid out and formed.

CARRIAGE also signifies the removal of goods, or other things from one place to another, especially with a carr or cart.

CARRIAGE also denotes the money or hire paid to a carrier, or other bearer of goods. See CARRIER.

The carriage of letters is called *postage*. See POST.

CARRIAGE *by sea*, is denominated FREIGHT.

CARRIAGE, *bill of, lettre du voiture*, among the French, denotes a paper given to a carrier, expressing the quantity and quality of the goods and parcels committed to him, partly to entitle him to receive his hire from the person to whom they are directed, and partly that this letter may shew whether all be brought, and whether in due time, and in the condition required.

CARRIAGE is also used, in *Geography*, to denote the space of ground, over which the inhabitants of New France, and other colonies of North America, who trade with the savages, usually, by means of canoes, are obliged to carry their boats and provisions, &c. on their shoulders. This they are forced to when they come to places in lakes or rivers, covered with willows, or otherwise rendered impracticable to pass by water, till they meet with some new place, convenient for re-embarking.

CARRICK, or CARRIG, the name of some towns, parishes, and headlands in Ireland, and the prefix to many more: it is supposed to signify a rock or stony place; and we accordingly find Carrick fergus called also Knock-fergus and Cragfergus, all signifying the *rock of Fergus*.

CARRICK, the name of a strong fort on a rock near the town of Wexford, built by Fitzstephens soon after his landing in Ireland, and afterwards enlarged and improved. Some time after, according to a note of Hooker's on Giraldus Cambrensis, it was pulled down and destroyed, because "it was not altogether sufficient for a prince, and yet it was thought too good for a subject." The name is still retained in the parish, and in a village called *Ferry Carrig*, where a wooden bridge was erected over the Slaney, by Samuel Cox, in 1795. It is two miles west from Wexford. Hollingshed.

CARRICK-on-Shannon, a post town of the county of Leitrim, Ireland, situated on the Shannon, and so called to distinguish it from the town mentioned in the following article. It was originally called *Carrick drum-rusk*, but being planted by an English colony, and made a borough town, it acquired its present appellation. It is a small place, not remarkable for any trade or manufacture; it is, however, the shire town of the county, and before the Union sent two Members to Parliament. Its distance from Dublin is 77 miles N.W. N. lat. 53° 55'. W. long. 8° 1'.

CARRICK-on-Suire, a market and post town of the county of Tipperary, Ireland, situated on the river Suire, between Clonmell and Waterford. The country in the neighbourhood is very beautiful, and the river being navigable for large sloops gives it the benefit of a communication with Waterford by water. Formerly this was a walled town, and had a castle belonging to the Butler family, a branch of which takes the title of Earl from it. Before the bridge of Waterford was built, which is a late structure, the bridge of Carrick was the nearest passage to that city from Dublin, by land, which in times of disturbance made it a very important pass. For many years, however, it has been more remarkable for its woollen manufactures, especially that of *ratteens*, which is carried on very extensively. The town is irregularly built, but large and very populous; and the inhabitants are industrious. On the Waterford side of the river is the suburb of

Carrick-

Carrick-beg, or *little Carrick*, which has some ruins, especially of an old abbey. A steeple erected on one of the side walls of the church, is accounted a great curiosity, projecting about two feet over the wall, from which it takes its rise in a point at twenty feet from the ground.

This town is mentioned by the abridger of Camden, in 1701, and called *Carrick-mac-Griffin*, but it is only of late years it has attained its present consequence. Its distance from Dublin is 75 Irish miles S. by W. N. lat. $52^{\circ} 20'$. W. long. $7^{\circ} 26'$. Beaufort. Smith, &c.

CARRICKAMACHIN *Isles*, a cluster of small islands and rocks off the coast of the county of Galway, Ireland, a few miles north of the Isles of Arran. N. lat. $53^{\circ} 13'$. W. long. $9^{\circ} 48'$. McKenzie. Beaufort.

CARRICKAREDE. See **BALLINTOY**.

CARRICKFERGUS, **CRAIGFERGUS**, or **KNOCKFERGUS**, *i. e.* the *rock of Fergus*, a market and post town of the county of Antrim, Ireland, on the northern shore of Carrickfergus Bay, or, as it is now usually called, Belfast Lough. It was an early settlement of the English, and was deemed a place of great importance. In 1232, Hugh de Lacy, Earl of Ulster, founded a monastery there, in the precincts of which he was buried a few years after. In the 14th century, when Edward Bruce invaded Ireland, his brother King Robert landed near Carrickfergus, and besieged the castle; which held out so long that the garrison were reduced to the necessity of eating leather, and surrendered only through want of food. In the reign of Henry the Seventh, this castle was one of those which an act of Parliament declared ought to be only entrusted to Englishmen. It was not, however, 'till the government of sir H. Sydney, in the reign of queen Elizabeth, that the adjoining town, the trade of which had become considerable, was surrounded with walls, and it was then made a corporation and endowed with many privileges. On the division into counties, a large district was allotted to it, and it still has a separate jurisdiction. The mayor was also made admiral of the coast of Antrim and Down, and certain duties were paid to the corporation of Carrickfergus by vessels going to any of the little neighbouring ports, excepting Bangor and Belfast. This privilege was purchased in the administration of lord Strafford, and the custom-house transferred to Belfast. See **BELFAST**. Lord Chichester, ancestor of the present marquis of Donegal, having purchased the grant of the monasteries at Carrickfergus about the year 1610, built a castle which was esteemed splendid in those days; but his attention seems to have been chiefly directed to the improvement of Belfast. Carrickfergus, however, continued a place of strength, and as such was taken possession of by general Monk, on behalf of the Parliament of England. In the year 1690, it was the landing place of king William; but though it continues to have a governor regularly appointed, its fortifications have been suffered to decay. In 1759, Thurot, an adventurer, who commanded a small French squadron, ventured to land here, and took hostages for the ransom of the town, but he was soon obliged to retire, and his ships were taken or destroyed by the English. Carrickfergus is the assize town of the county of Antrim, and sends one representative to the Imperial Parliament. It is distant 88 Irish miles N. from Dublin, and 8 N. E. from Belfast. N. lat. $54^{\circ} 43'$. W. long. $5^{\circ} 42'$.

CARRICKHOULT, a bay or anchorage on the county of Clare side of the river Shannon, Ireland, near its mouth. This bay has clear ground, and good anchorage between Carrickhoult castle and Kildarraan points. N. lat. $52^{\circ} 33'$. W. long. $9^{\circ} 36'$. Mackenzie.

CARRICKMACROSS, a market and post town of the county of Monaghan, Ireland, near the boundary of the

county of Louth. From its being mentioned by Stanihurst, it must be a place of antiquity, but does not appear to have been of much consequence. It is now an improving town, and a vein of good coal discovered near it will probably contribute to the establishment of some manufacture, especially as there is plenty of water, and a possibility of obtaining water carriage to Dundalk at no great expence. It is 44 Irish miles N. by W. from Dublin. N. lat. $53^{\circ} 57'$. W. long. $6^{\circ} 43'$.

CARRIER, a person who undertakes to convey persons, goods, papers, money, or the like, from place to place, on condition of a certain price, either fixed by authority or custom, or left to private agreement. See **CARRIAGE**.

In Holland *carriers* are called *rouliers*, because they always keep the same road, or route; setting out, and arriving at fixed hours.

All persons carrying goods for hire, as masters and owners of ships, lightermen, stage-coachmen, (but not hackney-coachmen in London) and such like, are legally comprehended under the denomination of common carriers, and are chargeable on the general custom of the realm for their faults or miscarriages. See **BAILMENT**. In an action on the case against the master of a stage-coach, it was adjudged that he was not chargeable (*e. g.* for a trunk lost) unless the master takes a price for the carriage of the goods as well as for the carriage of the person, in which case he is within the custom as a carrier; but by the custom and usage of stages, every passenger pays for the carriage of goods above a certain weight; and then the coachman shall be charged for the loss of goods beyond such weight. If a common carrier loses goods which he is entrusted to carry, a special action in the case lies against him, on the custom of the realm; and so of a common carrier by boat. 1 Rol. Abr. 6. An action will lie against a porter, carrier, or bargeman, upon his bare receipt of the goods, if they are lost by negligence. 1 Sid. 36. Also, if a lighterman spoils goods which he is to carry, by letting water come to them, an action on the case lies against him on the common custom. Palm. 528. If a carrier entrusted with goods opens the pack, and takes away any part of its contents, he is guilty of felony. H. P. c. 61. And it is the same also if a carrier receives goods to carry them to a certain place, and carries them to some other place, with intent to defraud the owner. 3 Inst. 607. If a common carrier, having convenience and being offered his hire, refuses to carry goods, he is liable to an action. 2 Show. Rep. 327. But he may refuse to admit goods into his warehouse at an unreasonable time, or before he is ready to take his journey. Lord Raym. 652. A common carrier may have action of trover or trespass for goods taken out of his possession by a stranger; and where goods are stolen from a carrier, he may bring an indictment against the felon as for his own goods; and the owner may likewise prefer an indictment against the felon. Kel. 39. By stat. 3 Car. 1. c. 1. carriers are not to travel on the Lord's day on pain of 20s. By 3 W. and M. c. 12. the justices are annually to assess the price of land carriage of goods that are to be brought into any place within their jurisdiction by any common carrier, who is not to take more, under the penalty of 5l. And by 21 Geo. II. c. 28. §. 3. a carrier is not to take more for carrying goods from any place to London than the justices have settled for the carrying of goods from London to such a place, under the same penalty. This act of 21 Geo. II. c. 28. stands repealed by 7 Geo. III. c. 40. so much of it excepted as relates to the price or rate for carriage of goods; and the 7 Geo. III. c. 40. (except so much as repeals the several acts within-mentioned) was repealed by 13 Geo. III. c. 78. §. 83. By 24th Geo. II. c. 8. §. 9. commis-

tioners for regulating the navigation of the river Thames are to rate the price of water-carriage; and by 30 Geo. II. c. 22. §. 3. justices of the city of London are to assess the rates of carrying goods between London and Westminster. By 13 Geo. III. c. 78. carriers and waggoners are to write or paint on their waggons or carts their names and places of abode; and the owner of every common stage, waggon, or cart, travelling from town to town, shall paint "common stage waggon or cart," as the case may be, under the pain of forfeiting not more than 5l. nor less than 20s.

At common law a carrier is liable by the custom of the realm to make good all losses of goods entrusted to him to carry; except such losses as arise from the act of God, or inevitable accident; from the act of the king's enemies; and from the default of the party sending them. 1 Inst. 89. 2 Lord Raym. 909. Esp. N. P. 619. But, in order to charge the carrier, the following circumstances are to be observed, 1. The goods must be lost while in the possession of the carrier himself, or in his sole care. 2. The carrier is liable only so far as he is paid, for he is chargeable by reason of his reward. 3. Under a special or qualified acceptance the carrier is bound no further than he undertakes; and, therefore, it seems safest, that in all instances of sending things of value by a carrier, the carrier should have notice and be paid accordingly. 4. A delivery to the carrier's servant is a delivery to himself, and shall charge him; but they must be goods, such as it is his custom to carry, not out of his line of business. Salk. 282. 5. Where goods are lost, which have been sent on board a ship, the action may be brought either against the master or against the owner. 2 Salk. 440. 6. It is not necessary in order to charge the carrier that the goods are lost in *transitu*, while immediately under his care; for he is bound to deliver them to the consignee, or send notice to him according to the direction; and though they are carried safely to the inn, yet if left there till they are spoiled, and no notice given to the consignee, the carrier is liable. 3 Will. 429. 2 Bl. Rep. 916. Jacob's Dict. by Tomlins.

CARRIER pigeon, a sort of pigeon used, when properly trained up, to be sent with letters from one place to another. This is the *COLUMBA Tabellaria* of the Linnean system.

It is larger in size than most of the other kinds. Its length from the tip of the beak to the end of the tail being often fifteen inches; but its greatest weight not twenty ounces. Its flesh is firm and its feathers close; it is long-necked, and of a better shape than most other pigeons. The upper chap of the bill is half covered from the head with a white or blackish tuberculous furfuraceous flesh, which projects or hangs over both its sides, on the upper part nearest the head, and ends in a point about the middle of the bill. This is called the *wattle*. The eyes are surrounded with the same sort of corrugated flesh for the breadth of a shilling, and their iris is red. Their beak is long, straight, and thick; their wattle generally broad across the beak, short from the head toward the point, and tilting forward from the head; and the head narrow, long, and flat; the neck very long and thin, and the breast broad; the feather is chiefly black or dun, though there are blues, whites, and pied.

It has its name from its remarkable sagacity in returning to the place where it was bred, though carried to great distances; from which property it was made use of to carry letters to distant places, as a speedy and safe method of conveyance.

They were trained to this method in Turkey and Persia, and were carried first, while young, short flights of half a mile, and afterwards more, till at length they would return from the farthest part of the kingdom. Every bashaw had a basket

of these pigeons, bred at the seraglio, which, upon any emergent occasions, as an insurrection, or the like, he dispatched with letters, braced under their wings, to the seraglio, only sending out more than one, for fear of accidents. Lightow assures us, that one of these birds would carry a letter from Babylon to Aleppo, which is thirty days journey, in forty-eight hours. This pigeon was employed, in former times, by the English factory, to convey intelligence from Scanderoon, of the arrival of the Company's ships in that port, the name of the ship, the hour of her arrival, and whatever else could be comprised in a small compass, being written on a slip of paper, which was secured in such a manner under the pigeon's wing as not to impede its flight; and her feet were bathed in vinegar, with a view to keep them cool, and prevent her being tempted by the sight of water to alight, by which the journey might have been prolonged, or the bill lost. The pigeons performed this journey in 2½ hours. The messenger had a young brood at Aleppo, and was sent down in an uncovered cage to Scanderoon, from whence, as soon as set at liberty, she returned with all possible expedition to her nest. At the season of the arrival of the annual ships, it was usual to send pigeons to be ready at the port. Some have asserted that the pigeon was at once sent down to Scanderoon in a cage; but others with greater probability affirm, that she was taught by degrees to fly from shorter distances on the Scanderoon road. It is also said, that the pigeons, when let fly from Scanderoon, instead of bending their course towards the high mountains surrounding the plain, mounted at once directly up, soaring still almost perpendicularly till out of sight, as if to surmount at once the obstacles intercepting their view of the place of their destination.

The custom of carrying on a correspondence between Aleppo and Scanderoon by means of pigeons was common in M. D'Arvieux's time. Mem. T. v. p. 496. Maillet, in his "Description de l'Egypte," vol. ii. p. 271, has given a very circumstantial account of this mode of conveying intelligence; and he also relates a story of a pigeon dispatched from Aleppo to Scanderoon, which, mistaking its way, was absent for three days, and in that time had made an excursion to the island of Ceylon; a circumstance then deduced from finding green cloves in the bird's stomach, and credited at Aleppo. Baumgarten mentions the flying of pigeons in his time (1504) in Egypt. Sir John Mandeville also mentions it in his Travels. In the time of the holy war, certain Saracen ambassadors who came to Godfrey of Antioch from a neighbouring prince, sent intelligence to their master of the success of their embassy, by means of pigeons, fixing the billet to the bird's tail. Bochart has collected numerous authorities for the antiquity of this custom both in Syria and Greece, (vol. ii. p. 15,) and more respecting its antiquity may be found in Pennant's British Zoology. Hirtius and Brutus, at the siege of Modena, held a correspondence with one another by means of pigeons. And Ovid tells us, that Taurosthenes, by a pigeon stained with purple, gave notice to his father of his victory at the Olympic games, sending it to him at Ægina. Ælian. Var. Hist. lib. ix. cap. 2. Pliny, lib. x. cap. 24. Anacreon tells us, that he conveyed a billet-doux to his beautiful Bathyllis, by a dove. Ode 9. The use of pigeons, as couriers between Aleppo and Scanderoon, and also Bagdad, has been discontinued for the last 40 or 50 years, because the Curd robbers killed the pigeons. See DRAGOON and HORSEMAN.

CARRIERA, ROSALBA, in *Biography*, an eminent female painter, was a native of Chiozza, in the Adriatic, where she was born, in 1675; and being destitute of personal charms, she gave scope to her mental abilities. Having manifested an early taste for painting, her father procured for

for her the instruction of an artist, from whom she learned to paint full size in oil; but afterwards succeeding in miniatures, she confined herself to this branch of the art, and carried crayon painting to a high degree of perfection. Her portraits, spread all over Europe, are as elegant and graceful in conception and attitude, as they are fresh, neat, and alluring in colour. Her Madonna, and other religious subjects, blend dignity, and even majesty, with grace. Her reputation was very widely extended; and whilst she exhibited specimens of her singular skill in Italy, at Paris, and Vienna, she received distinguished marks of respect and esteem. She lived with distinction in her native country, and her works were eagerly sought by the curious in distant nations. Incessant application deprived her of sight during the last ten years of her life. She combined music with painting; and at the advanced age of 82 years, closed her life, in 1757, after having amassed considerable property of her own acquisition. D'Argenville. Pilkington, by Fuseli.

CARRIERE. See CAREER.

CARRION, in *Geography*, a river of Spain, which joins the Pisuenga, near Duennas.

CARRION *di los Condes*, a town of Spain, seated on the river Carrion, in the province of Leon, on the frontiers of Old Castile; containing 10 parish churches, 10 convents, and 2 hospitals; 14 leagues W. of Burgos.

CARROBALISTA, in the *Ancient Military Art*, denotes a species of *balista*, mounted on wheels, and drawn by horses; by which it differed from the *manubalista*, which, being lesser and lighter, was thrown by the hand.

CARROCIUM, or CARROCERUM, in *Middle Age Writers*, denotes the banner, or chief flag of an army, which was mounted on a kind of chariot, and drawn by oxen.

CARROCK, in *Geography*, a mountain of England, in the county of Cumberland, 2265 feet above the level of the sea.

CARRODUNUM, in *Ancient Geography*, a town of Germany, according to Ptolemy, supposed to be the present Radom, in the palatinate of Sendamir.—Also, a town of Vindelicia, supposed to be the present Crainburg, on the Inn.—Also, a town of Upper Pannonia, which the interpreters of Ptolemy suppose to be the present Carnburg, on the banks of the Rab.—Also, a town of European Sarmatia, seated on the river Tyras. Ptolemy.

CARROG, a river of Wales, which runs into the sea, about 4 miles S.W. from Caernarvon.

CARRON, a river of Scotland, which runs into the sea, near Stonehaven, in the county of Kincardine.—Also, a small river of Scotland, which rises about the middle of the isthmus between the friths of the Forth and Clyde, and, after a course of about 14 miles, dividing the county of Stirling into two nearly equal parts, falls into the Forth, three miles E. from the Carron works, in the county of Stirling. This river seems to have been the boundary of the Roman province in North Britain; Antoninus's wall being in the vicinity of this river, and running parallel to it for several miles. This opinion is rendered probable by the situation of "Arthur's Oven," as it is called, which is supposed to have been a temple dedicated to Terminus, and erected near the Roman frontier. It stood on the west side of the river Carron, or between that river and Kinnaird. The mofs of Kinnaird, which was without doubt formerly united to that of Frofk, is distant only one mile and a half from the river, and the mofs of Kincardine is only twelve miles distant from the station at Camelon. Forests, therefore, in either of these places, would have afforded very convenient refuge to the Caledonians, whether they were making incursions into the Roman province, or harassing the Roman armies in their expeditions towards the north.

Besides, that a people more civilized than the ancient Caledonians must have been in this country before the mofs of Kincardine existed, is completely established by the discovery of a road on the surface of the clay at the bottom of that mofs, after the peat, to the depth of eight feet, had been removed. The direction of this road is from the Forth across the mofs towards a road, supposed to be Roman, which passes between the mofs and the river Teith. These roads probably communicated, and were parts of the military works of the Romans, and designed for the use of the troops employed to repel the incursions made by the Caledonians from the mountains into the Roman province. A passage in Herodian favours the opinion here advanced. That historian (lib. iii. cap. 48.) mentions the army of Severus passing *τα προβεβλημενα ρευματα τε και χαμαλα της Ρωμαιων αρχης*. He adds, that on this frontier the Barbarians usually made their escape, "and concealed themselves in the thickets and marshes." Edinb. Transf. vol. iii. p. 276. Near the middle of the course of this river, in a pleasant valley, stand two beautiful mounts, called the "hills of Dunipace," which are now planted with firs, and between which is seated the church of Dunipace. Tradition reports, that these mounts were raised as monuments of a peace concluded in that place between the Romans and Caledonians, and that their name is compounded of the language of both people; *dun*, signifying a hill in the old language of this island, and *pax*, peace, in the language of Rome: so that Dunipace denotes "the hills of peace." Others, however, have supposed that they are sepulchral monuments, which is an opinion, not improbable. See BARROW. As this river runs so near the boundary of the Roman province, if it be not itself the precise boundary, the adjacent country must unavoidably be the scene of many rencounters and battles. Accordingly, historians mention a bloody battle fought near this river between the Romans and the confederate army of the Scots and Picts in the beginning of the 5th century; and the translator, or the author, of Ossian's poems lays the scenes of some of them upon the banks of this river. About the distance of half a mile from the river, and near the town of Falkirk, lies the field of that battle which was fought by William Wallace and the English, in the beginning of the 14th century. It bears the name of "Graham's Muir," from the valiant John Graham, who fell there, and whose grave-stone is still to be seen in the church-yard of Falkirk.

CARRON, a village of Scotland, in the county of Stirling, seated on a river of the same name; celebrated for its extensive iron forges; two miles N. of Falkirk, and three miles above the entrance of the Carron into the frith of Forth. The river is navigable for some miles from its mouth, and a considerable trade is carried on upon it by small craft; for the convenience of which its channel has of late years been straightened and much shortened, and the great canal is connected with it by a cut and lock. See *Forth and Clyde CANAL*. The Carron ore is described by Mr. Kirwan, (Miner. vol. ii. p. 174.) as being an argillaceous stone, of a bluish grey, internally of a dark ochre yellow. It is found in slaty masses, and in nodules, in an adjacent coal-mine, of which it sometimes forms the roof. At the Carron-works, this ore is often smelted with the red greasy iron ore from Ulverston, in Lancashire, which imparts easier fusion, and superior value. These works, which have attained such distinguished celebrity, were first established principally under the direction of Dr. Roebuck, an ingenious chemist and physician of Birmingham, and by means of a capital furnished by his relations and friends, as well as those of his associate Mr. Garbet, in addition to their own. After a careful and minute comparison of the advantages and disadvantages of different situations in Scotland, he made choice

of a spot, on the banks of the river Carron, as the most advantageous situation for the establishment of the proposed iron manufacture. There he found they could easily command abundance of water for the necessary machinery; and in the neighbourhood of it, as well as every where along both the north and south coasts of the Frith, were to be found inexhaustible quarries of iron stone, lime-stone, and coal. From Carron also, they could easily transport their manufactures to different countries by sea. The communication with Glasgow, at that time, by land-carriage, which opened to them a ready way to the American market, was short and easy. To aid him in the execution of his undertaking, he engaged the co-operation of Mr. Smeaton, then the first engineer in England, and also of Mr. James Watt, then of Glasgow, but since better known for his inventive genius in the mechanic arts, both in Scotland and England. The necessary preparations for the establishment of the iron-works at Carron were finished towards the close of the year 1759; and on the first of January, 1760, the first furnace was blown; and in a short time afterwards a second was erected. See the article ROEBUCK. For the extension and improvement of this foundry, about 100 acres of land have been converted into reservoirs and pools, for water diverted from the river Carron, by magnificent dams built about two miles above the works, which, after turning 18 large wheels for the several purposes of the manufacture, falls into a tide-navigation that conveys its produce to the sea. For a further account of the machinery of these works, the number of its furnaces, the annual amount of iron smelted, &c. &c. see *BLAST Furnace*. See also CANNON. The present proprietors of this foundry are a chartered company, with a capital of 150,000*l.* sterling, a common hall, &c.; but their stock is confined to a few individuals.

CARRONADE, in the *Military Art*. See CANNON.

CARROOR, in *Geography*, a town and fort of Hindoostan, in the country of Mysore, and province of Coimbatore, seated on the Ambravetty; evacuated by the troops of Tippoo Sultan, on the 15th of June, 1790, when general Meadows, commander of the British forces, took possession of it, and made it a depôt for provisions; 38 miles W. of Trichinopoly. N. lat. 10° 57'. E. long. 78° 12'.

CARROT, in *Botany*. See DAUCUS *carota*.

CARROT, in *Gardening*. See DAUCUS.

CARROT, in *Husbandry*, is a large well-known tap-rooted plant, which, at present, is much employed in the feeding of different sorts of live stock; in which view it is a root of considerable utility and importance to the farmer. It is, however, only within these few late years that its application in this intention has been carried to any extent in this country. It was probably first introduced into field culture in the southern parts of the island from the Low Countries. There are several varieties of this valuable plant, but that which is the most proper for being cultivated in the field for the above use is that which is usually termed the *orange carrot*, in which the colour of the root is of a much more dark orange appearance than in any of the others; and, besides, it rises to a much larger size, and is more saccharine and juicy. See DAUCUS.

This sort of crop is capable of being cultivated probably to the greatest advantage on the warm, light, loamy, or sandy soils; but it succeeds well on other kinds, as on gravelly lands. Mr. Young properly remarks, that the proper sort of soil "should not be mistaken through common notions, or confined to a compass much within the reality. It is, says he, a general idea, that nothing but sands will do for carrots, but this is a mistake, the best soil for them is a sandy loam, rather light, but moist, of a great depth; in which there is little difficulty in ploughing to

the very beam of the plough, all the soil brought up being of the same kind, and as fit for vegetation as the surface." But, though he considers this sort of soil as the most perfectly adapted to this kind of crop, "it will, he conceives, thrive to great profit on the heavier loams, but not on wet ones, or clays. On good wheat loams of the gravelly kinds that plough easily they do well. At first sight, he supposes, they might, perhaps, be thought too stiff; but they will yield large carrots, though the expences of cultivation will run higher in cleaning the ground, &c."

In the preparation of the land for this sort of crop much tillage is by some considered unnecessary: "the best culture of carrots is," says the above author, "to let the barley or wheat stubble lie till you plough and sow, putting them in on one earth." But others are inclined to more tillage, and think that on whatever sort of soil this root may be grown, or after whatever kind of crop, the ground should constantly be ploughed as deep as possible in October, a second time in dry weather in February, and a third in March, for the reception of the seeds. By ploughing the land deep in October, two beneficial purposes are, they suppose, answered; the new soil is exposed to the influence of the winter's frosts, by which it is mellowed and rendered more fit for nourishing the plants; and the roots of the carrots are enabled, with more freedom, to push downwards, a circumstance of considerable importance in this kind of husbandry; for, if the roots meet with any obstruction in getting down, they are apt to grow forked, and throw out lateral roots, by which the crop is injured in a very material degree. Mr. Young, however, only conceives the second ploughing in February necessary, in cases when the surface mould is not expected to be in a state of sufficient fineness at the period of sowing. When the last ploughing or seed-furrow in March has been given, the land should be harrowed, and the surface made as fine as possible for the seed to be put in upon.

Though it is not absolutely necessary to make use of manure for this sort of crop, as good carrots may be grown without it, it is plain, from the numerous trials which have been made and recorded in different works, that it is only by the liberal application of it, that the largest quantity of produce can be afforded. Where it is applied it should be turned into the ground in a well-rotted state during the last ploughing in March.

At this period the seed should be sown in an even manner over the surface, in the proportion of five pounds to an acre, and harrowed in immediately in a light way. Mr. Young, however, advises, that where the land is sufficiently fine and mellow at the time of ploughing, in February, and proper for being harrowed upon, not to omit sowing upon that ploughing, "for, although March is the common season, the uncertainties of the weather are such, that the state of the land, in most cases, requires a greater attention than the name of the month; and carrot seed, let the weather be ever so severe, will take no harm. It may, says he, be sown without danger in November. In case March turns out very wet, and the sowing is driven into April, it is twenty to one that the crop will suffer." About the 25th of March is, however, the time most generally observed in the Suffolk practice.

In regard to the seed, it has been recommended by the author of "Practical Agriculture," for cultivators to be careful in saving it, by selecting some of the best and most perfectly formed roots annually of the preceding year's growth, and setting them out separately in the beginning or middle of March, in an open piece of ground for the purpose. The seed in this way will be ready in August; by which means the farmer will always be in possession of such good

C A R R O T.

good fresh feed as may be fully depended upon; which can seldom or ever be the case where it is purchased. As this sort of seeds is liable to adhere or cling close together, it is almost impossible to sow them with any degree of regularity or exactness, without adopting some method of separating them, before they are made use of in the way of seed. With this intention the best mode is probably that of mixing them with some sort of material that may render them more capable of being dispersed over the land, such as saw-dust, bran, or a light kind of dry sand, uniting the whole well by rubbing them together. By this means the seeds may be so disengaged and separated from each other, as to enable the seedman to scatter them with much more evenness over the surface of the ground. There is also another improvement in the culture of this crop, with respect to the seed, which is that of steeping it from one to two days in water, by which, it is said, the vegetation of it is greatly forwarded, which is a circumstance of much consequence to the crop.

Though we have seen that five pounds of seed are made use of to the acre in the broad-cast method; where the drill plan is followed, two or three pounds may be fully sufficient. The first of the above modes of sowing is, however, the most commonly practised, the seed being afterwards lightly harrowed in by a small harrow; and, as it is not much suited for being dispersed or delivered with exactness by the drill-machine, and the young plants easily set out to proper distances by the hoe, it is probably the most suitable method of putting in the crop.

The drill plan has, notwithstanding, been attempted in order to lessen the expence of hand labour in hoeing the crops by some farmers. In these cases, the seed is put in in equidistant rows, at twelve, fifteen, or eighteen inches distance from each other, according to the land and the mode of hoeing that is employed. In some instances drill-machines are not made use of, but the land is stricken into small drills or furrows by hoes or other implements for the purpose, and then the seed cast over the ground by the hand, and harrowed in lightly, or covered, by hoeing in the tops of the ridgelets, in a light even manner. When a drill machine is employed for this purpose, it is recommended by Mr. Amos to put the seed in to the depth of one inch in the rows, leaving the space of fourteen inches between them as an interval. The seed is prepared by previous steeping and mixing in the manner mentioned above, and the land afterwards harrowed over once in a place, in a light manner.

It is of great consequence that this sort of crop should be properly thinned out while the plants are in their early growth, and kept perfectly free from all sorts of weeds by repeated hoeings. In the first of these, which should be given as soon as the plants can be fully distinguished from the weeds that are about them, the work should be performed with three inch hoes, having handles not more than two feet in length, and be executed with great care and attention, as it is often extremely difficult to distinguish the young carrot plants from the weeds. The second hoeing should be given in a few weeks afterwards, according to the state of the crop, which may be performed with common hoes, and the plants be set out to proper distances. From eight to fifteen or eighteen inches each way are the most usual distances at which they are suffered to stand; and it has been found, from the experience of many years, in districts where they are the most cultivated, that carrots, which grow at such distances, constantly prove a more abundant crop than when the plants are permitted to stand closer together. The third hoeing is mostly given about the middle

or towards the end of June, and in this, besides destroying the weeds, another material circumstance to be attended to is, to set out the carrots at proper distances, and also whenever any have been left double at the former hoeings, to take the worst of the two plants away, so as to leave the rest perfectly clear and free from interruption. When the crop has been put in earlier than the usual period, the first hoeing should, Mr. Young says, be performed in the latter end of April, and when the weather is fine, as much injury may be done in executing it when there is much wet. And where the first hoeing has been given at the above time, the crops should, in the beginning of May, be well harrowed, and have a second hoeing towards the end of it. The harrowing will not, he asserts, "damage the young carrots, nor pull up one in twenty; but it will displace the weeds set again by rain, and check the growth of those that are got up since." The crops should likewise be looked over towards the latter end of August, and such straggling weeds as may be met with removed. This is more necessary than farmers in general suppose.

The expence of these different hoeings differs considerably in different situations, but is generally from 10s. to 18s. the acre, and in some places rather more.

There are differences in the carrot husbandry in different districts. In Suffolk, the farmers sow them after turnips, summer-land-barley, and pease set upon a rye grass lay; the crops upon the first are generally most productive; next to that they prefer the latter. In the first case they feed off the turnips by the beginning of February, and then lay the land up in small balks or furrows, in which state it remains till the second week in March, when it is harrowed down, and double-furrowed to the depth of about twelve inches, and the seed sown thereon, at the rate of four pounds and a half to the acre. As soon as the plants appear distinctly, they are set out with a small hoe at the distance of six inches from each other, they are afterwards hoed twice more at different times, according as the crop seems to require it; and it is not unusual to harrow them between the hoeings, which does no injury to the root, and frequently favours the expence of the third hoeing. When carrots are intended to be sown after pease, they usually plough the stubble as soon as the harvest is over, in order that the land may clear itself of weeds; in December, it is laid up in small balks to receive the benefit of the frosts; in February, it is harrowed down and manured at the rate of fifteen loads per acre; the manure is ploughed in to the depth of about four inches, and in the month of March the land is double-furrowed and the seed sown. By pursuing this method they say the manure lies in the centre of the soil, and not only affords nourishment and support to the carrot in its perpendicular progress, but renders it easy to be turned up by a single ploughing, and greatly promotes the growth of the succeeding crop of barley. But in Norfolk, where it is the practice also to sow carrots after a crop of turnips, the manure, after being put on the land in the beginning of March, is first ploughed in with a common plough, and afterwards the land is trench-ploughed about fourteen or fifteen inches deep, it is then harrowed very fine, and the seed sown about the middle of March, though the latter end of that month is probably better, as then plants come up early as soon as the early sown, and are attended with fewer weeds. The carrots are in this way generally ready to hoe in the beginning of May, and when tolerably free from weeds, may be hoed with large hoes. Carrots are also frequently grown with the same preparations on the same land where potatoes have grown. The manner in which Mr. Billing cultivated his land for these plants, is the following: The wheat and
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clover stubbles were split down by him with the plough the preceding November, and he is satisfied, that whether the wheat stubble, be, as it is called in Norfolk, flat work, or in ridges, or the carrots are to be sown after clover or rye grais, the land cannot be ploughed too early, so that the frost and snow may have their full effect in mellowing the ground for the reception of so small a seed; and this is the more necessary to be attended to, the stiffer and tougher the soil is. He ploughs the wheat and clover stubble three times, but the land on which the turnips have been, but twice; the first time shallow, but the last as deep as the staple of the ground will permit, and on this ploughing the carrots are sown. Sometimes the land is immediately dunged for the carrots, but at other times only for the previous crop: the former is probably the better method. Mr. Billing thinks four pounds of feed an acre is fully sufficient. It is generally three weeks after sowing, and sometimes longer before the carrots appear, and they are frequently seven or eight weeks before they are fit for the hoe, which affords the weeds an opportunity to get strength in this season, as they grow fast. Mr. Billing is therefore of opinion, that it is better to sow them as late as you can with safety to the crop, as he found those sown in April on clover-stubble, came much the soonest to the hoe, though later sown. In this mode where the crop of carrots is very clean, one hoeing may, he thinks, be sufficient; but, where the weeds are strong, it is necessary to hoe them a second time; but about ten days or a fortnight after the first hoeing, they should be harrowed: this will displace the weeds, and prevent their growing again, which many of them will probably otherwise do, especially if it be showery weather. The harrowing does not hurt the carrot plants, as has been observed above, but, on the contrary, does them service, by bringing fresh earth to them, as well as by destroying the weeds. In about three weeks after harrowing where the ground is not cleared, or in case new weeds spring up, Mr. Billing hoes the carrots a second time; and after this, if there still remain any weeds, which will be the case if much rain falls during the time of the second hoeing, a third harrowing is bestowed. But where the weather has been favourable, and those employed in hoeing have done their duty, the carrots once hoed and harrowed have been, he says, as clean as those on which two hoeings and as many harrowings have been practised.

It is the remark of an Essex farmer, that carrots will amply repay every expence of the finest culture, and should from their extensive utility, on sound, deep, and friable land, be every where attempted. He sows in March or April; hoes three times, and harrows after each hoeing.

The expence of cultivating this crop on poor sandy land of five shillings an acre in the Suffolk method, is thus stated.

	Expences.	£.	s.	d.
One deep ploughing,	-	0	7	0
Seed and sowing,	-	0	4	6
Hoeing,	-	1	1	0
Taking up 1s. a load of forty bushels topped, that is on two hundred,	-	0	5	0
Carting home,	-	0	5	0
Rent, tythes, and rates,	-	0	7	0
		£2	9	6

The charges at present stand considerably higher, even on soils of this sort, as well as those of the better kind.

In an experiment of the Rev. Mr. Young's, detailed in a late volume of the Annals of Agriculture, made on a good sandy friable loam, sufficiently dry for turnips being eaten

off, on it; having a sub-soil of the gravelly loam kind, the expences and produce were as below, on eight acres. The land was ploughed nine inches deep in the early part of March; and in the last week of it three pounds of seed per acre were harrowed in; but the work does not seem to have been performed with sufficient accuracy.

	Expences.	£.	s.	d.
Ploughing at 8s.	-	3	4	0
Seed, 45 lbs. at 1s. 6d.	-	3	7	6
Sowing,	-	1	6	0
Harrowing,	-	0	8	0
Hoeing four acres at 25s. and four at 21s.	-	9	9	9
Ditto, second time, eight acres at 10s.	-	4	0	0
Taking up and clearing 4360 bushels, at 3s. per load of 40 bushels,	-	16	6	9
Seventy-four days work of one horse, at 2s. 6d.	-	9	5	0
A bailiff for attending the work,	-	3	3	0
Farm general expences, fines 1s. per acre,	-	0	8	0
Ditto, lundries, 1s. per acre,	-	0	8	0
Rent, tythes, and rates,	-	12	0	0
Sl. per acre,	-	£63	6	0

	Produce.	£.	s.	d.
By 2933 bushels, sold at 7d. and 8d.	-	92	7	2
— horses 160 bushels used, to Dec. 20th, saved	-			
7 coombs, 2 bushels of oats,	-	4	18	0
— saddle horse, 26 at 7d.	-	0	15	2
— 200 lambs 2 weeks at 2d.	-	1	13	4
— hogs 548 bushels at 8d.	-	6	17	0
— 8 cattle on the tops 2 weeks	-	0	16	0
— horses 72 bushels at 7d.	-	2	2	0
— hogs to Dec. 29th, 60 bushels,	-	0	15	0
— Ditto, 158, at 3d.	-	1	19	6
— horses, 112 at 7d.	-	3	5	4
— hogs, 10½ at 8d.	-	0	7	0
— saddle horse, 15 at 8d.	-	0	10	0
— hogs 8 at 8d.	-	0	5	4
— cow, 3 at 8d.	-	0	2	0
— 50 bushels half rotten sold for	-	0	18	0
Expences,	-	£117	10	10
Profit,	-	63	6	0
		£54	4	10

This is 6l. 15s. 7d. per acre profit, besides the land being left in most excellent order for barley, which fully shews the vast advantage of cultivating this kind of crop wherever the farmer has land capable of admitting it.

Of the advantage of the drill culture there are different opinions, but further trials are necessary. Mr. Amos's method is "two pounds of seed per acre." He sows the seed in rain water twenty-four hours, and lays it upon a floor, until speared. Mixes it thoroughly, with three pecks of dry saw-dust, and three pecks of fine dry mould. Drills one inch deep and fourteen inches between the rows, with the same cups used for wheat or barley. Harrows once in a place. The plants appear in eight or ten days. On expressing his surprize at seeing good long carrots grown on very shallow sands, to a person who had been many years bailiff to several estates, he told him that he had been accustomed to obtain carrots of full length and size, in such land, by dibbling the seed to a great depth, with an iron dibbler; and when it was objected, that the plants, from the seed being so deeply buried, would never get above the surface; he assured him, in his numerous trials, he never observed any such consequence.

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It is stated by a writer in the twenty-fourth volume of the *Annals of Agriculture*, that he sowed broad-cast two acres of carrots, following a potatoe crop, on a light sandy loam of twenty shillings an acre. They were twice hoed, at thirteen shillings the two, in the manner of hoeing turnips; and in the course of the Summer he mowed one third of the tops twice; another third of the tops once: and the remaining third of the crop the scythe did not pass over. The tops were greedily devoured by his horses, cattle, and pigs, in the fold-yard, and were equal in quantity and value to a considerable crop of clover, cut and made use of in the same mode. At the end of October he took up the carrot roots and preserved them in a trench in the manner of potatoes. The crop was full six hundred bushels per acre; and it was not found that the roots of those carrots whose tops had been twice cut were at all inferior in size or quality to those whose tops had been left untouched. A passage was left for a small cart to carry off the tops, and another he made by drawing the young carrots wanted for family use. He has reason to consider this mode of cultivating carrots equal to the best fallow crop, provided the carrots are twice well hoed, and the tops are cut off, as the scythe prevents any weeds feeding in the autumn. His horses, oxen, milch cows, and pigs, were fed with the carrot roots; his turkeys and other poultry had them in a boiled state, and were fatted well upon them: even his pigeons were fed upon carrots, as they constantly attended in the fold-yard to pick up every particle that dropped from the mouths of the cattle; which supply was sufficient to keep them at home, and to save an expence in feeding them in the severe weather. The market price of carrots near his house, twelve miles east of York, was from ten-pence to one shilling a bushel; at which price it must be allowed, he says, that the crop was a profitable one. He further remarks, that the demand for carrots in his neighbourhood for stallions is not inconsiderable, for it is found that this food is more invigorating and fattening than any other that can be given them.

Though it is a common practice with farmers in Suffolk to allow crops of carrots to remain in the ground all winter, it ought by no means to be generally recommended; as besides the injury the crop may frequently sustain by severe frosts, the farmer must often experience great difficulty in getting up a sufficient quantity of roots for the supply of his live stock, especially when the earth is bound up by frost or covered with snow. On these grounds it is evident that the best way of preserving carrots during winter and spring is to dig them up in the end of October, or beginning of November, when their green leaves are decayed, which is a common practice in Leicestershire. In doing this, the best method is to make use of three-pronged forks, though spades are frequently used. By loosening the soil with either of these instruments, and drawing up the carrots at the same time by the tops, the work is performed in a very expeditious manner. The carrots should be allowed to dry a day or two on the field before they are taken home; on being dug up, when they are dry, the tops may be taken off and given to the swine or cattle; and the roots be piled up in heaps in some close dry house, well covered up, either with straw or dry sand, so as to defend them from frost and dampness. Where the business of taking up the roots is delayed till November, Mr. Young well observes, that in case of wet weather they are liable to be much injured. It is observed by an Essex farmer that it is his practice to take them up on a dry day, put them directly into small upright cocks of ten bushels each, entirely covered with the tops cut off; they thus appear to dry better than in any other mode; and with very little loss, to bear the weather. If after being

thus dried, they are carried into any barn, or shed, it will be better, if in large quantities, on account of the hazard of heating, not to pack them close, but rather throw them promiscuously into heaps with a little straw over them. Some however pile them up in a conical manner with a few of the tops hanging down on the outside, and others place them in a ridge of earth in the manner of potatoes.

According to the account of Mr. Arthur Young, in Suffolk, a medium crop may be reckoned at three hundred and fifty bushels the acre, which at six-pence the bushel, the price at which they are sold to be sent to the London markets, amounts to $\text{£}1. 15s. \text{cd.}$ the acre. Hence, though the hoeing and digging up of a crop of carrots may be attended with considerable expence, the above gross produce will amply repay, and leave a very handsome profit.

The uses to which this root are applied are various. Large quantities are sent to the London markets, and also given as food to different kinds of live stock. Horses are remarkably fond of carrots; and it is even said, that when oats and carrots are given together, the horses leave the oats and eat the carrots. The ordinary allowance is about 40 or 50 lb. a day to each horse. Carrots, when mixed with chaff, that is, cut straw, and a little hay, without corn, keep horses in excellent condition for performing all kinds of ordinary labour. The farmers begin to feed their horses with carrots in December, and continue to give them chiefly that kind of provender till the beginning or middle of May, to which period, with proper care, carrots may be preserved. As many farmers are of opinion that carrots are not so good for horses in winter, as in spring, they give only half the above allowance of carrots, at first, and add a little corn for a few weeks after they begin to use carrots.

The result of the inquiries made by the above author in Suffolk, as stated in the survey of that district, is, that they give "at Sutton six horses two loads a week; no corn, and eat little hay. At Shottisham, six horses one load a week, with corn; in the spring two loads, without corn; eat little hay. At Ramsholt, six horses 72 bushels a week; no oats, and half the hay saved. At Alderton, six horses 42 bushels a week; oats given, and the saving of hay not considerable. At Alderton oats given, because not carrots enough. At Hollesley, six horses two loads a week; no corn, save more than half the hay." And upon reviewing these circumstances, says the same writer, "it appears that two loads a week are a very large allowance, probably more than are necessary; seeing that with 72 bushels at one place, which is one and three quarters, and one load at another, all the corn is saved: let us therefore decide, that when six horses eat 80 bushels of carrots a week, which is 13 bushels a week for one horse, they want no corn whatever, and will eat only half the hay of corn-fed ones. This will enable us to ascertain the value tolerably, though not exactly, because we do not, says he, know what would be the fair allowance of oats to balance such feeding with carrots." The whole turn of the intelligence he received ran, he says, upon the vast superiority of condition in which horses are kept by carrots to that which is the result of corn-feeding; for this evident reason, carrots are given nearly, if not quite, in as large quantities as the horses will eat them; but the oats are never given in such a manner, they are always portioned out in an allowance far short of such plenty. A quarter and a half of oats would, he is persuaded, from the general turn of every man's conversation, be inferior to two loads of carrots; this at 20s. is 1l. 10s. and there is to be added the saving of half the hay, which may be called 10 pounds per horse a day, or 70 pounds per week, which, at 50s. a ton, is 1l. 4s. per horse, and 8s. for six; which added to 1l. 10s. for corn, makes in all 1l.

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18s. against 80 bushels, or 19s. a load; and that this is a moderate calculation, appears, he thinks, from the decided preference given by several farmers in favour of carrots at 15s. a load, against oats at 20s. a quarter, not reckoning the carrots by any arbitrary estimation, but supposing themselves forced to buy the one or the other. The prime cost is calculated at 7s. a load; and that this is fair, will, he thinks, appear by the following statement of the articles:

	£.	s.	d.
Rent, tythes, and poor-rates	-	-	0 15 0
Ploughing	-	-	0 7 0
Harrowing, &c.	-	-	0 1 0
Seed and sowing	-	-	0 6 0
Hoeing	-	-	0 18 0
Taking up ten loads, at 1s. 2d. per load	-	-	0 11 8
			<hr/> 2 18 8

The tenth of which is, he says, 5s. 10d. or per bushel one penny three-farthings; call it, however, two pence per bushel, or 6s. 8d. per load, and if to square with one article of intelligence it is made 7s. it will not amount to two pence farthing the bushel: here, therefore, says he, another view opens upon us, which is the farmer's profit; the carrots are worth, in feeding his team, 15s. but they cost him only 7s.; he has therefore the advantage of 8s. a load as the grower, on all his horses consume, and on an average 4l. an acre.

Another way by which a friend of his, he says, made his calculation, was this: "at one load and a half of carrots, nine loads a moderate acre, last six horses six weeks." He was inclined to think, from the intelligence, that one load and a half ought to be esteemed the proper quantity, and save six quarters of oats, which at 20s. is

Three cwt. and a half of hay a week saved, 21	£	6	0	0
cwt. at 2s. 6d.	-	-	-	-
				<hr/> 2 12 6

The carrots may cost

Farmers profit per acre by feeding horses

	8	12	6
	3	3	0
	<hr/> 5	<hr/> 9	<hr/> 6

It admits of various calculations, says the writer; but view it in any light you please, the result is nearly, though not exactly, the same. Two facts result, he thinks, most clearly from the intelligence; viz. that horses will do upon them as well as upon oats, and that this application will not only pay the charges of culture, but leave a profit nearly as great as the gross produce of a common crop of wheat. He wonders, therefore, the farmers cultivate them for their own use alone, without any view to a sale. It should farther be remarked, he says, that this result takes place, not in a district where the horses are poor mean animals that betray a want of good food, but, on the contrary, amongst the most useful teams that are to be found in England; and that these teams are the fattest, and in the highest condition, when they are supported by carrots. No greater proof of the excellency of the food can, he thinks, be wished for, than the horses going through the barley-sowing upon it, and the root doing better at that season of hard labour than earlier in the winter; this seems to speak, he says, the heartiness as well as wholesomeness of the food. One conclusion very naturally arises from this part of the intelligence, that the crop, or a considerable part of it, ought to be taken up in autumn, and packed in a barn, in which they would much sooner lose their juiciness, and acquire a more withered state, in which they are found to yield the best nourishment for animals."

But the author of the New Farmers' Calendar, who says he has given carrots to horses of every description, and that the practice is perfectly familiar to him, observes "that neither cart nor saddle-horses, although they will perform very well whilst fed with carrots, are able to go through so much labour, or to do it with so much ease or safety to themselves, as when they are allowed corn; and the only proper application of carrots to horses is to such as either do not work at all, or very moderately; but should the carrots be substituted for hay instead of corn, it makes a very material difference in the question, and in many cases such a dispensation might be advantageous in all points. If a man can maintain his cart-horses in good working order and good health, as many really do, upon these roots, instead of oats, he has nothing farther to say, except in praise of his economy; he only insists, that the very severe labour which he has been accustomed to see horses go through, could not be endured without corn; and that he has known horses absolutely ruined by working them upon carrots, when the labour was by no means hard enough to have injured them had they been properly fed with corn. He has little to say on this subject, since he has himself sufficiently often ridden and driven horses carrot-fed, watching their daily condition, and marking even the dew upon their coats, the heaving of their flanks, and the comparative tone of their muscular exertions." This writer's opinion, however, seems chiefly to rest upon their being a laxative, and consequently a debilitating food, which is probably not the case when they are taken up and kept in a dry place for a proper length of time, so that a portion of the juicy material may be dissipated.

In March this sort of food is in the greatest perfection, as much of the succulence of the roots is dissipated, and from their being in some degree withered, they bend in the hand. Every part of them is then highly nutrient, being full as hearty a food as oats. It is, of course, an object of vast importance to the farmer to be well provided with this root for use in February, March, and the following months.

Carrots have likewise been made use of for fattening cattle with great success; some, indeed, think that this is the most advantageous way of applying them; and there cannot be any doubt but that they must be highly useful in this way; from the great quantity of saccharine matter they contain. They have also been long proved to be excellent food for milch cows in the spring; as they certainly give no bad taste to the milk or butter, while the quantity of both is greatly increased by their use. For this last use they should probably be employed without being much kept, as in that way there will be the largest proportion of the juicy liquor in them, which is of advantage in this intention.

Sheep have also been frequently fattened on this root in Suffolk; and from Mr. Young's account, who seems to have fully considered the carrot-husbandry, a good crop will weigh 11 tons, which quantity, he supposes, will feed 20 wethers for 100 days, in which space they will be completely fattened. In Norfolk it is reckoned a good crop of turnips that will fatten eight wethers; so that it would seem that one acre of carrots will go as far in fattening sheep as two acres and a half of turnips, which is a circumstance that deserves the farmer's attention in many situations. The same writer also further states, that the expence of cultivating carrots exceeds that of turnips by 1 l. the acre. To counterbalance which, he says, the carrots are much more impenetrable to frost, if left in the ground to be taken up as wanted; that they are not subject to any distemper similar to that of the fly in turnips; and that they are sown at a season when they cannot suffer by drought; while, of late years, turnips have suffered so much in various ways, as to have subjected the farmers,

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farmers, particularly those of Norfolk and Suffolk, to very heavy losses. Besides, as carrots can be preserved with certainty to an advanced period of the spring, as April or May, when the fattening of cattle is more expensive than at any other season, the superiority of carrots over turnips must, he thinks, appear evident to every practical farmer. He further adds, that with all these advantages, it might naturally be expected that carrots should be more universally cultivated, and that the only reason why they are not, is because their value is not ascertained, or made generally known. Some such reason as this would appear also to be the cause why the cultivation of so valuable a crop should be confined to one particular district of the kingdom; which, without doubt, if it were commonly cultivated, would be the means of saving an immense consumption of oats, beans, and peas, which are at present given to horses and other animals. This sort of crop is likewise of great utility in the keeping of store-pigs; but they will not probably fatten them without the assistance of corn or milk. In the experiments of the reverend Mr. Young, this seems to have been exactly the case, as the hogs, in many instances, gained weight, though they did not become fat under this management. See SWINE.

The able writer of the Suffolk report has further remarked, that the next circumstance to be attended to is the advantage of the plant as a preparation for corn; all the minutes agree, says he, that the barley after them is good and clean; several persons were inclined to think it equal to that after turnips fed on the ground; but the fair result is evidently, that if carrots were so fed, the barley would be much superior; of this the intelligence he received will not, he says, permit us to doubt. It is, however, fair to observe, that they one and all declare for putting them in upon clean land, and in this course: 1, turnips; 2, barley; 3, carrots; 4, barley, &c.; from which it appears, that on these sandy soils they are not to be depended upon for cleaning them when foul with couch.

The utility and advantage of the carrot root have been already shewn in many instances; it is, however, obvious, that the value of crops of this description must vary in a considerable degree, according to the manner in which they are employed in their consumption. The differences have been found to be from two pence halfpenny to two shillings the bushel; in general it may, however, be from about sixpence to eight-pence, and perhaps in some instances tenpence or a shilling. In the trials of different experimenters, as stated in the 25th volume of the Annals of Agriculture, under different modes of application, the results were these:

<i>Application of crop.</i>	<i>Value per Bushel.</i>
In feeding all sorts of cattle	0 0 2½
Average in different ways	0 1 0
In fattening oxen	0 0 6
In fattening hogs, boiled	0 2 0
When used instead of oats for horses	0 0 6
In fattening hogs, raw	0 0 8
In fattening sheep	0 0 4

It has been remarked by a late practical writer, that from the great facility of cultivating this sort of crops, the little risk that attends them, their very general application in the feeding and fattening of different sorts of domestic animals, the large proportion of manure that they afford, and their great utility in the preparation of the land for grain crops; they may in most cases be considered not only preferable to turnips, but much more advantageous and better suited to all soils of the pure sandy or light sandy loam kinds.

It has been suggested by Mr. Baker, that the large tops

of this root might be rendered more extensively beneficial by having them converted into a sort of coarse hay, by mowing them over while in their young, green, juicy state of growth, without injuring the heads or crowns of the plants, somewhat in the manner noticed above; and then letting them become perfectly dry on the ground; as in this way, he asserts, that two tons of fodder may be produced from an acre of land. It is plain, however, that in this practice injury must be done to the growth of the roots, besides its being uneconomical, on account of the great loss that must take place in the drying of such succulent materials, which can be wholly consumed without it. It is unquestionably a much less wasteful method of management to have them consumed in the yards by some sort of stock, as they are taken up; because in this way not a particle is lost, from the great avidity with which almost all sorts of animals devour them.

When it is thought necessary to have the roots cleaned before they are given to animals, it may be readily performed in the same manner as for potatoes.

The author of the Agricultural Survey of the County of Suffolk concludes this interesting subject with "earnestly calling on all persons who have sand, or light sandy loams, to determine to emancipate themselves from the chains in which prejudice or indolence has bound them; to cultivate this admirable root largely and vigorously; to give it the best soil they have; to plough very deep; to hoe with great spirit; and to banish corn from their stables, as a mere luxury and barren expence, that ought to be extirpated: an effect that flows very fairly from the preference which the instinct of the four-footed inhabitants generally gives to carrots." They should not, he thinks, be confined to small closes of an acre or two, but be introduced regularly in the courses of the crops of the farm in the same manner as wheat, barley, turnips, or any other plant. None, in his opinion, pay better, and very few so well; and besides they are capable of a very general application, no root being fit for serving more useful purposes.

The penalty for stealing carrots is the same with that for stealing turnips, potatoes, cabbages, parsnips, and peas; for which see TURNIPS.

CARROT, *wild*, in *Agriculture*, a weed of the biennial kind frequently met with in pasture lands, where the soil is inclined to be dry. Wherever it is found it should be extirpated as soon as possible before it flowers and sheds its seeds, as if this is not attended to, it will increase with rapidity, and become very troublesome as well as difficult to remove. It has sometimes the name of *birds' nest*, from the head, after flowering, contracting somewhat into that form. See DAUCUS.

CARROT, *Candy*, in *Botany*. See ATHAMANTA *crenatis*.

CARROT, *Deadly*, or *Scorching*. See THAPSIA.

CARROT, *Mountain*, a species of fennel. See FENNEL.

CARROUGE, BERTRAND-AUGUSTIN, in *Biography*, an ingenious astronomer of France, was born at Dol, on the 8th of October, 1741, and on account of his merit and indigence, he was appointed "Administrateur General des Postes," by Reveilliere-Lepaux, the director. Notwithstanding his advancement to this office, which rendered him, in some degree, independent, he applied with diligence to astronomy. He calculated 1000 stars for the celestial globe published by C. Lamarche, successor to Fortin, and made many calculations for the "Connoissances des Temps," and the second edition of Lalande's astronomy. He also published several memoirs in the "Connoissances des Temps," and, a few days before his death, which happened on the 29th of March, 1798, he delivered to Lalande tables for calculating the phases

phases of the moon, better, as this historian of astronomy says, than those which are in Bouguer's and La Caille's "Elements of Navigation." They are contained in the "Connoissances des Temps" for 1801. Lalande's Hist. of Astronomy for the year 1798.

CARROUGE, in *Geography*. See CAROUGE.

CARROUSAL, or CARROWSAL, properly a course, or contest of chariots and horses: or a magnificent entertainment, on occasion of some public rejoicing; consisting in a cavalcade of several persons, richly dressed, and equipped after the manner of the ancient cavaliers, divided into squadrons, meeting in some public place, and practising jousts, tournaments, and other noble exercises. The term is since become of more general use, and is given to any merry meetings. The word comes from the Italian *carosello*, a diminutive of *carro*, *chariot*. Tertullian ascribes the invention of carroufals to Circe; and will have them instituted in honour of the Sun, her father: whence some derive the word from *carrus*, or *currus solis*. The Moors introduced cyphers, liveries, and other ornaments of their arms, with trappings, &c. for their horses. The Goths added crests, plumes, &c.

CARR-TAKERS, are officers of the king's household, who, when the court travels, have charge to provide waggons, carts, &c. to transport the king's furniture and baggage.

CARRUCA, in *Antiquity*, a splendid kind of carr, or chariot, first mentioned by Pliny, mounted either on one wheel, like our wheel-barrows, or, as is more probable, on four wheels, richly decorated with gold, silver, ivory, &c. in which the emperors, senators, and people of condition, were carried. The carrucæ, or coaches of the Romans, were often of solid silver, curiously carved and engraved; and the trappings of the mules, or horses, were embossed with gold. This magnificence continued from the reign of Nero to that of Honorius; and the Appian way was covered with the splendid equipages of the nobles, who came out to meet St. Melania, when she returned to Rome, six years before the Gothic siege. Seneca Epist. 87. Pliny H. N. xxxiii. 49. The Romans considered it as an honour to ride in those that were remarkably high. In the Theodosian code the use of them is not only allowed to civil and military officers, but enjoined as a mark of their dignity.

The word comes from the Latin *carrus*, or British *carr*, which is still the Irish name for any wheel-carriage.

CARRUCA was also sometimes used for *carrucata*. See CARRUCATE.

CARRUCA, in *Rural Economy*, a term employed by some old writers to signify a plough. It is sometimes written *Carruca*.

CARRUCAGE, in *Husbandry*, a term which denotes the ploughing of ground, either ordinary, as for grain, hemp, flax; or extraordinary, as for woad, dyer's weed, rape-seed, &c.

CARRUCAGE, *carucagium*, a kind of tax anciently imposed on every plough, for the public service. See CARUCATE and HIDAGE.

CARRUCATE, or CARUCATA, in our *Ancient Laws and History*, denotes a plough land, or as much arable as could be tilled and managed by one plough and the beasts belonging thereto in a year; having meadow, pasture, and houses for the householders and cattle belonging to it.

In the Domesday Survey, the hide and carucate appear to be the same; the hide being the measure in the Confeffor's reign; and the carucate that to which it was reduced by the Conqueror's new standard. Thus, different

places are said to have paid gold for so many hides, T. R. E. in the time of the Confeffor. And then follows the *existing* measure of so many carucates, "Est ix. Carucatarum." Mr. H. P. Wyndham, however, in his "Wiltshire, extracted from Domesday Book," 1788, distinguishes between "hida" and "carucata," though they have hitherto been considered as synonymous terms. Accordingly, he conjectures, that the first was intended to signify "the valuation of the estate," and the latter "the measurement of the land."

In some of the counties, as those of Nottingham, Derby, and Lincoln, only carucates are mentioned. But in others, as we have already mentioned, both occur.

The contents, however, of the carucate are very variously stated; and, in fact, we have no criterion in any one county for judging of its real extent. The Liber Niger, as well as several of our ancient chartularies, esteem it to contain a hundred acres; while it is carried by other authorities to a hundred and twenty; and the Liber Eliensis asserts, that some consisted even of two hundred and forty acres. In the early part of the reign of Richard I. it is stated to have been estimated at sixty acres; and so to have continued till his ninth year, when in the five shilling aid, it was fixed at a hundred. In the time of Edward I. it appears to have been more than once estimated at a hundred and eighty acres: and in the 23d of Edw. III. a carucate of land in Burcester contained a hundred and twelve acres, and in Middleton a hundred and fifty. Nor was the calculation of its extent under other circumstances less liable to variation. The Monasticon Anglicanum (tom. i. p. 75.) says, that fourteen carucates made a knight's fee. A manuscript register of Fountain's abbey, sixteen. Another mentions twelve. And one of Dodsworth's manuscripts in the Bodleian goes to forty-eight. A charter of the 5th of Edward III. records, that each of three carucates of land which the abbot of Netley held in the New Forest consisted of a hundred acres; and a similar measure is repeated in a patent of Henry IV.

The measurement of the carucate then appears to have been arbitrary, and differs considerably not only in different counties, but even in different districts of the same county. It appears, likewise, to have been various at various times. And for different purposes a larger or a less number of acres appears to have been required. It seems clear, says the historian of Leicestershire, that the commissioners, in the survey of that county, at least, from the conviction that hides and carucates were of no certain measure, and that they differed still more in quality than they did in measure, adopted the very rational mode of determining the value of the land by the number of ploughs that were actually employed, or in their judgment might be employed on it. "We sometimes find that the number of ploughs is considerably less than the number of plough-lands; and sometimes the commissioners tell us the land would have admitted of more ploughs than were then in actual use. And it is but reasonable to conclude, that certain lands had been in a better state in the time of king Edward, than they were in the reign of William I. from their having more ploughs at work on them; and, on the contrary, that other lands were much improved at the time of the survey, as they had more ploughs at work than had been employed in the days of the Confeffor. There are few passages in some of the counties that can be made intelligible in any other way of interpretation. Nichols's Diff. on Domesd. Pref. to the Hist. of Leic. Disc. i. 46, 47. Hutchins's Diff. Kelham's Domesd. Book. Illustr. p. 168. Selden. Tit. of Hon. 622. By a statute under William III. for charging persons to the repair of the highways, a plough-land is rated at

at fifty pounds per annum, and may contain houses, mills, wood, pasture, &c. Stat. 7 and 8 Will. III.

CARRUCCI, JACOPO, called *Pontormo*, from the place of his nativity, in *Biography*, was born in 1493, possessed great natural ingenuity, and in his earliest works was admired by Raphael and Michael Angelo. His instruction, derived in regular succession from Leonardo da Vinci, Albertinelli, and Pier di Cosimo, was completed in the school of Andrea del Sarto, who, by jealousy and ungenerous treatment, converted the scholar into a rival. Notwithstanding his talents, he frequently changed his style and became the victim of inconstancy. The "Certosa" of Florence exhibits specimens of the three different manners commonly ascribed to him. The first, being correct in design and vigorous in colour, approaches the style of Andrea del Sarto: the second, combining with good drawing a languid tone, became the model of Bronzino and the subsequent epoch. The third is a direct imitation of Albert Durer. To these might be added a fourth manner, if the frescoes of the general deluge and universal judgment, on which he spent eleven years, and his last work, had not been white-washed, with the tacit acquiescence of all contemporary artists. In this labour he strove to imitate Michael Angelo, and to exemplify, like him, anatomic skill, which was then becoming the favourite pursuit of Florentine art. This artist died in 1558, aged 65. Pilkington, by Fuseli.

CARRYING, in *Falconry*, signifies a hawk's flying away with the quarry.

Carrying is one of the ill qualities of a hawk, which she acquires either by a dislike of the falconer, or not being sufficiently broke to the lure.

CARRYING, among *Huntsmen*. When a hare runs on rotten ground (or even sometimes in a frost), and it sticks to her feet, they say she *carries*.

CARRYING, among *Riding-Masters*. A horse is said to *carry low*, when, having naturally an ill-shaped neck, he lowers his head too much. All horses that arm themselves *carry low*; but a horse may *carry low* without arming. A French branch, or gigot, is prescribed as a remedy against *carrying low*.

A horse is said to *carry well*, when his neck is raised, or arched, and he holds his head high and firm, without constraint.

CARRYING *wind*, a term used by our dealers in horses to express such a one as frequently tosses his nose as high as his ears, and does not carry handsomely. This is called *carrying wind*; and the difference between *carrying* in the wind, and beating upon the hand, is this: that the horse who beats upon the hand, shakes the bridle and resists it while he shakes his head; but the horse that carries in the wind puts up his head without shaking, and sometimes beats upon the hand. The opposite to *carrying* in the wind, is arming and *carrying low*; and even between these two there is a difference in wind.

CARS, LAURENCE, in *Biography*, a French engraver of great merit, flourished about the year 1760, and resided at Paris. His prints were numerous; and the following are from Le Moine, viz. a portrait of "Louis XIV. surrounded with emblematical figures;" "Hercules and Omphale;" "Perseus and Andromeda;" "Time and Truth," and "Nymphs Bathing." Strutt.

CARS, in *Geography*, supposed by some to be the *Chorfa* of Ptolemy seated on the banks of the Euphrates, a city of Armenia, the last town of Turkey towards the frontiers of Persia. It is built on a rising ground, exposed to the south-south-east. It is defended by a castle, built on a steep rock, and has behind it a deep valley, watered by a river, which,

not far from thence, disembogues itself into the Arpagi, without ever coming near the city of Erzzeron, contrary to the description given of it by Sanfon. These two rivers joined together are known by the name of Arpagi, and serve as a frontier to the two empires. N. lat. 41° 30'. E. long. 43° 50'.

CARSE, or *Carfe of Gowry*, a district of Perthshire, in Scotland, lying on the N. side of the Tay, extending 14 miles in length from Dundee to Perth, and being from two to four in breadth. It is a rich plain country, cultivated like a garden, and producing as good harvests of wheat as any in Great Britain. Its situation, however, is damp and low, so that the inhabitants are subject to agues, and the common people are in great want of fuel for firing.

CARSEOLI, in *Ancient Geography*, a town of Italy, belonging to the Sabines at the 22d mile on the Valerian way. Livy calls it in one place a town of the Marfi, and in another a town of the Æqui; and it might probably have been occupied by one and the other of those people alternately. Livy says that it was a Roman colony, established in the year of Rome 454; and in the map of M. D'Anville it is marked in the country of the Sabines. The precise situation of this place was not known till it was discovered, in 1645, by Hollstenius, near the mountains called "Rio-Fieddo," and it has been again ascertained, in 1766, by the abbé Chauppy. From an ancient inscription found in this place it appears, that this city was a colony, and that it had a college of priests called "Dendrophori," consecrated probably to some rural deity.

CARSIDAVA, a town of Dacia, according to Ptolemy, supposed to be the present Kuryma.

CARSOLI, in *Geography*, a small ill-built town of Naples, seated on the side of a steep hill, which shuts up a defile of the mountains. It is just within the limits of the Neapolitan state, for in the plain below is the point of division at an inn called "Il Cavaliere," where some custom-house officers are stationed. This town bears the name of the ancient city of Carsoli, though its ruins lie near a mile off in the plain. Carsoli is a portion of the immense demesne possessed by the countable Colonna, who has 37 manors in this neighbourhood.

CARSTARES, WILLIAM, in *Biography*, an eminent Scots clergyman, was the descendant of an ancient family, and born in 1649 at Cathcart, near Glasgow. Having received the rudiments of his education in the academy of a Presbyterian clergyman, where he formed many important connections, and where he acquired a fluency of expression in the Latin language, as no other was allowed to be spoken in his family; he pursued his theological and philosophical studies in the university of Edinburgh, and afterwards at Utrecht, whither his father sent him for the purpose of avoiding those political contests which agitated the reign of king Charles II., and to which his active and enterprising spirit seemed to incline him. Here, however, he was involved in those political intrigues which were occasioned by the alarm excited in England about the Popish succession. By means of a letter of recommendation, obtained from a physician in London, who carried on a correspondence with persons belonging to the court of the prince of Orange, he was introduced to the pensionary Fagel, and afterwards to the prince himself; and by him he was entrusted, on account of his sagacity and information with regard to the state of political parties at home, and his ardent attachment to the interests of civil and religious liberty, with his designs relating to British affairs. During his residence in Holland, his principles, both in religion and politics, were strongly confirmed; and upon his return to his native country, he entered

tered with zeal into the counsels and schemes of those noble-men and gentlemen who opposed the tyrannical measures of government. His political engagements, however, did not divert him from pursuing the profession of divinity; and when he had passed through his previous examinations, he obtained a licence to preach. But as he had no prospect of usefulness in his clerical character, and as his mind seemed to have acquired a decided bias towards politics, he determined to revisit Holland. On his way thither he passed through London, and was employed by Argyle, and the other Scots patriots, in treating with the English exclusionists. Towards the close of the year 1682, he held various conferences with the heads of that party, which terminated in his being privy to what has been called the "Rye house plot." Accordingly, he was committed to close custody in the Gate-house, Westminster. After several examinations before the privy council, he was sent for trial to Scotland; and as he refused to give any information respecting the authors of the exclusion scheme, he was put to the torture, in order to extort from him a confession. This cruel treatment he endured with invincible firmness; but when milder methods of a more insidious nature were adopted, and a pardon was proposed, with an assurance that no advantage should be taken of his answers as evidence against any person, his resolution failed, and he consented to answer their interrogatories. The privy council immediately caused to be printed a paper, entitled, "Mr. Carstares's Confession," which contained, as he said, a false and mutilated account of the whole transaction; and in direct violation of their promise, they produced his evidence, as they termed it, to be produced in open court against one of his most intimate friends. This treachery and its consequences very deeply affected him; but as soon as he was cleared, he obtained permission to retire to Holland, towards the close of the year 1684, or the beginning of 1685, where he was kindly received by the prince of Orange, who appointed him one of his chaplains, and caused him to be elected minister of the English Protestant congregation at Leyden. In this situation he was singularly useful to the prince and his party in concerting those measures that terminated in the revolution. When the prince determined to transport an army to England, Carstares accompanied him as his chaplain, and continued about his person till the settlement of the crown. During the whole of this reign he was the chief agent between the church of Scotland and the court, and he contributed by his influence with the king to the establishment of presbytery in Scotland, to which his majesty was disinclined, and to that coalescence or accommodation on the part of the Presbyterian clergy with the Episcopalians, which the bigotry of the former made it difficult for him to effect. When an act was passed, in 1693, by the Scots parliament, obliging all officers, civil and ecclesiastical, to take an oath of allegiance, and also to sign an *assurance*, (as it was called), declaring William to be king *de jure*, as well as *de facto*, the ministers refused to sign the declaration, and appealed to the privy council, who recommended to the king to enforce the obligation. Accordingly, measures were adopted for this purpose; and the body of the clergy applied to Carstares, requesting his interference in their favour. The king persisted in his resolution; orders were renewed in peremptory terms, and dispatches were actually delivered to the messenger to be forwarded next morning. In these critical circumstances Carstares interposed; he hastened to the messenger at night, demanded the dispatches, which had been delivered to him in the king's name, and instantly repaired to Kensington, where he found his majesty gone to bed. Having obtained admif-

sion into his chamber, he gently waked him, fell on his knees, and asked pardon for the intrusion, and the daring act of disobedience of which he had been guilty. The king at first expressed his displeasure; but when Carstares further stated the case, his majesty caused the dispatches to be thrown into the fire, and directed him to send such instructions to the royal commissioners of the general assembly as he thought most conducive to the public good. In consequence of this seasonable interposition, the oath and assurance were dispensed with on the part of the clergy. By this timely service Carstares acquired the confidence of the Presbyterian party to such a degree, and he so successfully cultivated the friendship of the earl of Portland, and other men of influence about the court, that he was regarded in the management of Scots affairs, as a kind of viceroy for Scotland, though he possessed no public character. Although he acted with consummate prudence and delicacy, he could not escape envy; but he retained the esteem of those whom he most valued; and the king once said of him, in the presence of several of his courtiers, "that he had long known Mr. Carstares; that he knew him well, and knew him to be an *honest man*."

Although, after the death of king William, Carstares was not much employed in public affairs, queen Anne continued him in the office of royal chaplain for Scotland, and obtained for him the offer of an appointment to the vacant place of principal of the university of Edinburgh; which he accepted in 1704, with the first professorship of divinity. After this appointment, whilst he refused any addition to his own salary, he used his influence at court for augmenting the very small salaries pertaining to the regents in the several universities of Scotland; and in the execution of his office, as principal, he secured the affection and respect of those that were subject to his authority, by the dignified affability and gentleness of his deportment. In the year of his appointment to the principalship of the university, he was unanimously invited to the pastoral office in one of the parishes of Edinburgh, which he performed with exemplary diligence; and as moderator of the general assembly, which post he occupied four times in eleven years, he maintained great weight in its debates. When the union of the two kingdoms was agitated, it engaged his cordial concurrence, and he was the principal instrument of preventing any public opposition from the Presbyterian clergy. His efforts to control the bigotry of this body rendered him unpopular; and with a view of gaining their good opinion, he accepted the office of one of the agents, sent to London to oppose the bills for the restoration of patronage in Scotland, and for the toleration of the episcopal clergy; though in the latter instance, at least, his opposition must have counteracted his principles. His excuse seems to have been an apprehension that the Scots episcopalians wished the exiled family to be restored. His efforts, however, whether they were sincere or not, proved unsuccessful. To the succession of the house of Hanover he gave his active support; and he obtained from the general assembly an address of congratulation to George I. on his accession to the throne; and in return for this service his office of royal chaplain was continued. His death happened soon after this event, in December, 1715. "His private character was highly respectable. His religion was free from enthusiasm and superstition, and his charity and bounty comprehended all sects and parties. His memory is revered by his countrymen as that of a true and enlightened patriot, and few have held an active course amidst violent public contentions with less reproach." See State papers and letters, addressed to William Carstares, confidential secretary to king William, during the whole of his reign, afterwards principal

of the university of Edinburgh, relating to public affairs in Great Britain, but more particularly in Scotland, during the reign of king William and queen Anne; to which is prefixed the life of Mr. Carstairs; published from the originals, by Joseph McCormick, D.D. minister at Preston-pans. 1774. 4to. Biog. Brit.

CARSULÆ, in *Ancient Geography*, a town of Italy, in Umbria, situate between Narnia and Mavania, on the Flaminian way. According to Strabo it was a place of considerable note, and from Tacitus we learn, that it was about 10 miles distant from Narnia. Livy assigns it to a people called Carfuli.

CARSUM, a town of Lower Moesia, according to Ptolemy. It is placed in the Itinerary of Antonine between Capidava and Cion.

CARSUMBLIA, in *Geography*, a town of European Turkey, in the province of Servia; 12 miles W. of Precop.

CARSUS, in *Ancient Geography*, a river of Asia, in Cilicia; which sprung in mount Amanus, near the town of Erana, ran to the south-west between the branches of this mountain, watered the town of Epiphania, and discharged itself into the Mediterranean, at the bottom of the gulf "Issicus."

CART, a vehicle mounted on two wheels, drawn by horses, used for the carriage of heavy goods. The word seems formed from the French *charette*, which signifies the same; or rather the Latin *caretta*, a diminutive of *carrus*. See CARR.

Mr. Sharp's *rolling cart* is fixed upon two rollers, running a-breast, or parallel with each other, and both placed under the body of the cart, working upon pivots like the wheel of a wheel-barrow. The rollers are both cylinders of cast iron, two feet diameter, and sixteen inches broad. An iron spindle passes through the centre of each roller, upon the ends of which rest the four planks that support the body of the cart. Criminals are drawn to execution on a cart. Bawds, and other malefactors, are whipped at the cart's tail.

Scripture makes mention of a sort of carts or drags, used by the Jews to do the office of threshing. They were supported on low thick wheels, bound with iron, which were rolled up and down on the sheaves to break them, and force out the corn. Norden and Niebuhr, in their "Travels," inform us, that this method of threshing is still practised in Egypt and Arabia. The former says that in Egypt they thresh, or rather tread, rice by means of a sledge drawn by two oxen, and that the man who drives them is upon his knees, whilst another has the care of drawing back the straw, and of separating it from the grain that remains underneath. In order to tread the rice they lay it on the ground in a ring, so as to leave a void circle in the middle. The Arabians, says the latter writer, in threshing their corn, lay the sheaves down in a certain order, and then lead over them two oxen, dragging a large stone. They use oxen in Egypt, he adds, as the ancients did, to beat out their corn by trampling upon the sheaves, and dragging after them a clumsy machine. This machine is not, as in Arabia, a stone cylinder; nor a plank with sharp stones, as in Syria; but a sort of sledge, consisting of three rollers, fitted with irons which turn upon axles. A farmer chooses out a level spot in his fields, and has his corn carried thither in sheaves upon asses or dromedaries: two oxen are then yoked in a sledge; a driver gets upon it, and drives them backwards and forwards, or rather in a circle upon the sheaves, and fresh oxen succeed in the yoke from time to time. By this operation, the chaff is very much cut down:

the whole is then winnowed, and the pure grain thus separated. Something of the like kind also obtained among the Romans, under the denomination of *plausfra*, of which Virgil makes mention. Georg. I.

*Tardaque Elusina matris volventia plausfra,
Tribulaque, trabeaque—*

On which Servius observes, that *trabea* denotes a cart without wheels, and *tribula* a sort of cart armed on all sides with teeth, used chiefly in Africa, for threshing corn. The Septuagint and St. Jerom represent these carts as furnished with saws, inasmuch that their surface was beset with teeth. David having taken Rabbah, the capital of the Ammonites, ordered all the inhabitants to be crushed to pieces under such carts, moving on wheels set with iron teeth; and the king of Damascus is said to have treated Israelites in the land of Gilead in the same manner. 2 Sam. xii. 31. Amos. i. 3. Calm. Dict. Bibl. tom. I. p. 366.

CART, in *Agriculture*, is a carriage or vehicle constructed with two or more wheels, and drawn by one or more horses. It is employed for the purpose of conveying manure, hay, grain, and various other articles which are connected with the farm. Carts are made of different forms and dimensions, in some districts according to the nature of the materials they are intended to carry, and the uses to which they are applied; but by suitable contrivances they may be easily constructed, so as for the same cart to serve different uses. In the more southern parts of the kingdom this is mostly the case, by which there is not only a considerable saving, in fewer carts being wanted, but likewise in less room being taken up by them in the sheds or houses where they are kept. In these situations they are mostly formed in a close manner, having ladders or other similar contrivances applied when they are wanted to convey any of the more bulky sorts of materials, such as hay, straw, &c.

It is obvious that the chief object in the construction of carts should be to adapt the wheels and axle in such a manner, that the power may be applied in the most favourable direction for draught, and that the carriage may move with the least possible force. In this view the height of the wheels should likewise be well adapted to that of the animals which are employed in drawing them; but the exact heights which are the most favourable under different circumstances have not yet been fully shewn by any trials that can be fully depended upon. There is likewise another point which ought to be particularly considered in the making of farm-carts, which is, that they are not more heavy than is necessary; which is too often the case in the southern parts of the island. It has been remarked that the large heavy carts and waggons, which are so common in the southern districts, are not only reprobated, but almost wholly in disuse in those of the north, where small carts are in general use. Though there cannot be any doubt but that carts must vary in their forms, sizes, and modes of construction, according to the nature and situation of the roads, and many other local circumstances; yet for the purposes of farming, especially in field work, probably those of the light, single, and two horse kind may in general be the most advantageous, convenient, and useful.

It has been observed, in the twenty-seventh volume of the *Annals of Agriculture*, by lord Robert Seymour, that "the advantages of single-horse carts are, he believes, universally admitted, wherever they have been attentively compared with carriages of any other description. By his own observation he is led to think that a horse, when he acts singly, will do half as much more work as when he acts in conjunction with another; that is to say, that two horses will, separately,

separately, do as much work as three conjunctively: this arises, he believes, in the first place, from the single horse being so near the load he draws; and, in the next place, from the point or line of draught being so much below his breast, it being usual to make the wheels of single horse carts very low. A horse harnessed singly has nothing but his load to contend with, whereas when he draws in conjunction with another, he is generally embarrassed by some difference of rate, the horse behind or before him being quicker or slower than himself; he is likewise frequently inconvenienced by the greater or lesser height of his neighbour: these considerations give, he conceives, a decided advantage to the sort of cart he is recommending." If any other is wanted, that "of the very great ease with which a low cart is filled may, he says, be added: as a man may load it, with the help of a long-handled shovel or fork, by means of his hands only; whereas, in order to fill a higher cart, not only the man's back, but his arms and whole person must be exerted." To the use of single horses in draught he has heard no objection, unless it be the supposed necessity of additional drivers created by it: the fact however is, that it has no such effect; for, horses once in the habit of going singly, will follow each other as uniformly and as steadily as they do when harnessed together; and accordingly we see, says he, "on the most frequented roads in Ireland, men conducting three, four, or five, single horse cars each, without any inconvenience to the passenger: such likewise, is the case in this country, in which lime and coal are generally carried upon pack-horses, where one man manages two or three, and sometimes more." And in a preceding volume of the same work, Mr. Young is decidedly of the same opinion, which he clearly shews to be founded in truth, by entering into a variety of discussion in respect to the points in which they are preferable to tumbrils or waggons. In the northern districts they usually draw in these carts from twelve to twenty-four hundred weight, and where the roads are good, occasionally thirty, with much ease and facility.

And Mr. Donaldson, in his view of the "Present State of Husbandry in Great Britain," seems to think that, "for carrying on the ordinary operations of husbandry, carts drawn by two horses are greatly superior to large, cumbersome, unwieldy waggons, that require four, five, or six horses to move them along. It has of late," says he, "been a subject pretty much agitated, whether single-horse carts are not to as great a degree superior to those drawn by two horses, as these have been represented to be to waggons. Single-horse carts are certainly loaded and unloaded with much less trouble, and are in every way more easily managed, especially when carrying out dung, or when used for doing any odd jobs on a farm." It has also been found, from long experience and the most attentive observation, that "one horse will draw, on any road, two-thirds of the load that two horses, drawing in a line, and of equal power, are capable of doing. The carters of the town of Falkirk, in Stirlingshire, for example, have long been famous for the great weights drawn by their carts. Before the navigable canal between the Forth and Clyde was made, the whole goods transported to and from Glasgow, and the ports upon the Forth, were," says he, "drawn upon one and two-horse carts belonging to these carters; the most expert of whom have long given the preference to carts drawn by one horse, as they experience no difficulty in carrying upon a cart, drawn by a single horse, from Borrowkinnon to Glasgow, a distance of upwards of thirty miles, and of indifferent road, from twenty to thirty-five hundred weight." It is, he observes, further worthy of remark, that "at the great iron-

work at Carron, the company engaged in it formerly made use of waggons and waggon-ways, to wheel their coals and other heavy articles upon: but have entirely laid aside the use of them, and on principles of economy, employed carters with single-horse carts to transport the heavy articles which they require."

In the agricultural report of Northumberland it is likewise remarked, that "single-horse carts are becoming more prevalent in several parts of that county; and that Mr. James Johnson, a common carrier at Hexham, has a horse, sixteen hands high, that commonly carries from Hexham to Newcastle 24 cwt., and 20 cwt. back again; and there are instances of his having carried 26 cwt. from Newcastle to Hexham, which is a very banky, heavy-pulling road." It is also further noticed that "the neatest, most useful, and best contrived carts we know, are those made in many parts of the North-Riding of Yorkshire. The single-horse carts of this construction, used for carrying coals from the county of Durham into Yorkshire, are 60 inches long, 36 inches wide, and 18 deep, hold 24 bushels of coals, when set round the sides with large ones and upheaped. A man, or boy, drives three of these, two of which are equal to the greatest quantity ever carried by three horses." Mr. Charge of Newton, sends three of these carts for coals every day, which bring 72 bushels, the distance of 26 miles, there and back, which is performed in 12 hours by one man. The same gentleman's two-horse carts bring 36 bushels of the same coals.

And in the agricultural survey of Cumberland, the writers say, "the advantages of single-horse carts are so well understood in this county, that we did not see any other used. Three single-horse carts are driven without any difficulty, by a man, or boy, or even women and girls."

The author of the Agricultural Report of Mid Lothian, states, that "the wheel-carriages employed in husbandry are only the clove-cart and the corn-cart, both of a light construction, drawn by two horses, and of late by one. The large wains, or heavy four-horse waggons, employed in English husbandry, are discarded there. Two horses in a cart are commonly loaded with 18 or 20 cwt. One horse draws still more easily 12 cwt.; even 24 cwt. is frequently put on a single horse; and 30 cwt. on good roads is not uncommon." And that "the first sort of cart has lately been much improved: when placed on its axle, the bottom at each side projects over the inner head of the naves as far as nearly to touch the spokes of the wheels; from which acquired breadth the capacity is enlarged; while the side-standards, being brought nearer to a perpendicular, are able to sustain more weight." The dimensions are, the length five feet three inches; the breadth below, four feet; the breadth above, four feet three inches; the depth, one foot three inches; containing about a cubic yard. The price of a cart, painted, 11. 15s. not including wheels, axle, or mounting, which may amount in all to seven or eight pounds more. The wheels are generally 52 inches high, the axle commonly of iron, from an idea, that, in the end, it is more economical to have them so: for it is not found in practice that iron axles are either more or less difficult to draw, although not half the thickness, of those of wood."

It has been suggested on the ground of much experience, that, in constructing carts of this sort, the capacity of waggons is by no means an accurate rule to proceed by; as on finding that they contained in the bed, or *luck*, ninety-six cubical feet, being twelve feet long, four feet wide, and two feet in depth; it was supposed that to give one horse the fourth part of the load of four, it would only be necessary to let the cart have the space of twenty-four cubical feet, or

to make it four feet by three, with the depth of two; but from the vast superiority of horses working singly, over those in teams, it was soon discovered, that they required to be very considerably enlarged, admitting of having the dimensions of five feet one inch in length of bed or *buck*, three feet seven inches in breadth, with two feet in depth; so as to contain thirty-five cubical feet and a fraction. This, therefore, affords a further striking proof of the great superiority these small carts have over those of the large kind, in the quantity of work which they are capable of performing.

In speaking of the advantage of having low cast-iron wheels, it is remarked by lord Seymour, in the paper just mentioned, that "the price of iron, cast into wheels, is 16s. per cwt., and the weight of each wheel about three quarters of a cwt. Two inconveniences only, he believes, have been found from the use of low cast-iron wheels: the first is, that cast-iron is very liable to breakage, upon concussion; the next is, that the course of so small a diameter creates a very quick consumption of grease. The first of these objections is in a degree removed by the ease with which the rim of the wheel is repaired by the application of worked iron, which being joined to it by a rivet, the wheel acquires some little elasticity, and thereby becomes perhaps stronger than when it was new. In order that the supply of grease may keep pace with the consumption, he has introduced four grooves, or cavities, in the boxes, increasing a little towards their centres; and in order to defend the axle-tree, which consists of worked iron, against the harder body of the box, he has steeled the extremity of it."

These small carts are considered by many, from actual experience, to be better adapted to the carrying of all sorts of materials except those of the very bulky kinds, and such as trees, blocks of stones, &c. the weights of which might injure them, and which cannot from their nature admit of division. In all hilly districts where the roads are of an inferior kind, and the inhabitants poor, these are the carts that are in most general use, and which are found the most advantageous. The superior goodness of the roads in some of the northern parts of the kingdom have likewise been ascribed to the use of these kinds of carts, as large carriages of all sorts that require the wheels to be locked in descending hills, are the destruction of roads.

By the author of the New Farmer's Calendar it is stated that "of the great saving to be made by one-horse carts there can be no doubt, since it has been experimentally proved, and was moreover, easily to be discovered from just theory. More weight may be drawn by six horses in so many carts, than by eight in a large waggon; and one man may manage two carts in the country." There are, however, he thinks, "some peculiar inconveniences attendant upon this plan, which are sufficiently obvious; and, says he, notwithstanding it has been, for years past, so warmly recommended by very powerful pens, it never has, nor probably ever will be, relished by the generality of farmers."

After this view of the nature of carts in general, and of the particular advantages of single-horse carts; it may be useful to describe the different sorts of carts that are employed in the business of husbandry.

Close cart, a name given to all such carts as have no ladders, rails, or wings, attached to them. They are made close by boards, and mostly employed in conveying dung, gravel, earth, or such other materials as have considerable weight, in a small compass. By the application of wings or ladders to them, they are however, frequently made to serve the double purpose of conveying heavy close matters as well as those of a light bulky nature. This sort of cart is represented at *fig. 3. Plate III. of Agriculture.*

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Corn cart, is that sort of cart which is only placed occasionally on wheels, for carrying hay, corn in the straw, or other light bulky articles; carts of this kind are generally composed of standard rods, and spars, without deals, but broader and much longer than the close cart, that they may hold a more bulky load. They cost from 20s. to 30s. in Scotland, but in England they are considerably higher. They are commonly employed in the northern parts of the kingdom for carrying hay, grain in the straw, and other similar bulky materials. A cart of this sort is shewn at *fig. 4. Plate III.*

Coup cart, a cart of the close kind, so denominated from the body-part resting on a sort of frame, to which it is kept by means of staples, or other contrivances, through which a cast-bar, or wooden pin, is put, by which it is confined, and which can be readily removed when the load is to be either partially or wholly discharged. Carts of this sort are generally used in putting dung upon land, and are convenient for many other purposes in husbandry. See *fig. 3. Plate III.*

Drag cart, a sort of cart invented by lord Somerville, which is constructed with a drag, or some other contrivance, for checking, or regulating the rapidity of the motion in going down hills, or other declivities. A full account of this cart has been given in the second volume of "Communications to the Board of Agriculture." At *fig. 5. in Plate III.* is a perspective view of a cart of this sort to be drawn by two strong oxen, by a pole, yoke, and bows, made to carry 45 cwt. In the front of this *figure* is represented the method which his lordship has contrived for adjusting the position of the centre of gravity of the load, to prevent its pressing too much on the cattle in going down hill, the front of the cart being elevated by means of a toothed rack screwed to the front of the cart, and worked by a pinion, and the handle, *a*, immediately connected with the pole, *e*. By means of this pinion and rack, the front of the carriage is elevated more or less, in proportion to the declivity of the hill, by which means the weight of the load is made to bear more on the axis, and less on the necks of the oxen.—On the side view of this cart is represented the manner of applying the friction-drag, which is made to press more or less on the side of the wheel, according to the steepness of the descent:—*bb* is the friction-bar, or drag, the one end of which is connected with the tail of the cart by a small chain, and the other end to the front, by means of a toothed rack, *bd*, which catches on a staple in the front of the cart, by which the friction-bar may be made to press on the side of the wheel, more or less, at the discretion of the driver: the notches or teeth in this rack, it is observed, should be as close to each other as circumstances will permit. And in this representation, the friction-bar is, he remarks, applied lower upon the wheel than was at first proposed, in order to divide the pressure and friction more equally on the opposite sides of the wheel, so that the pressure on each is diminished, the risk of over-heating and destroying the friction-bars is also rendered less, than if the whole pressure was applied in one point on the top of the wheel. The weight of the iron-work of this cart is 2 cwt. 20 lb. This is unquestionably an useful contrivance for hilly districts. At *fig. 5. in the same Plate*, is a side view of a cart of this kind of a smaller size, to carry 25 cwt. and to be drawn by steers, or small oxen, with the friction-drag, *bb*, out of use; and representing another and more simple method of adjusting the centre of gravity of the load to the declivity of the descent: *ab* is part of the arch of a circle, whose radius is nearly equal to its distance from the axis of the cart, and having several holes in it, through which a strong iron pin is put, to keep

the body of the cart at any desired inclination with the pole:—*c*, a small chain to prevent the body of the cart being thrown too far back, through the carelessness of the driver in adjusting it:—*dd*, the upper stage of the cart, for carrying bulky loads.—The weight of iron in this cart is 1 cwt. 30 lb. This is a very useful, neat, light sort of cart for many purposes.

The advantages of the friction-drag, and other contrivances in this cart, according to the ingenious account of Mr. Cumming, contained in the same volume, are,

“1. The method, which is equally simple and expeditious, of adjusting the centre of gravity of the load, so as to have a proper bearing on the horses or cattle in going down hill, the advantage of which must be obvious to every man of science, more especially with bulky loads, in which the centre of gravity lies high.

2. The method of applying friction to the side of the wheel to regulate the motion of the carriage in going down hill (instead of locking the wheels), the advantages of which method appear to be as follow: namely, 1st. The pressure and degree of friction may with great expedition be adjusted to the steepness of the declivity, so that the carriage will neither press forward, nor require much exertion to make it follow the cattle. 2dly. The friction is so applied to the wheel, that a given pressure will have twice the effect in retarding the progress, that it would have if immediately applied to the body of the carriage, or to the axis: and by applying the friction on both sides of the wheel, the risk of heating and destroying the friction-bar is much less than if the same degree of friction was applied in one place. 3dly. This apparatus is so conveniently placed, that it can be instantly applied or adjusted, without stopping the carriage, or exposing the driver to the same danger as in locking a wheel. And, 4thly. This useful contrivance, in which he says simplicity and ingenuity are so happily blended, will assume yet greater importance when applied to both the hind wheels of waggons, by which means the resistance may always be proportioned to the steepness of the descent, the tearing up of the road prevented, the unnecessary exertion of the cattle in drawing the locked carriage down hill avoided, the danger to which the driver is sometimes exposed in locking the waggon wheel totally avoided, and the time now lost in locking and unlocking the wheel saved to the proprietor.” These are certainly advantages of much importance in many districts where the roads are hilly.

At *figs. 7 and 8* in the same *Plate* are views of carts to be drawn by a single horse, by shafts. By an attentive comparison of those drawn by shafts, with those that are drawn by the yoke and bows, the superiority of the pole to the shafts, and the advantage of making the cattle to draw by the yoke in preference to drawing by the forehead, become evident. When cattle draw by the shafts, says his lordship, the one before the other, it is impossible for the driver to know that each exerts an equal force, so as to contribute equally to the draught; but when they draw by the pole and yoke, the point of draught being in the middle of the yoke, when the beasts draw equally, the yoke will stand square with the pole, and the position of the yoke will always enable the driver to discover the defaulter, and to bring him to a proper exertion: it is, he says, this harmony of draught, and equality of exertion, that gives so great advantage to drawing by the yoke, that it is scarcely possible to say what weight of load two good large oxen can draw on a level road.” The powers of cattle drawing by the forehead, on lord Shannon’s estate, are recorded by Mr. Young and Mr. Billingsley:—an ox of the late

Mr. Tatterfall, near Ely, drew four tons of wood on a level surface without apparent difficulty. What then, says he, “might not be expected from the equal exertion of two such powerful animals, acting at the equal ends of the same yoke?” Notwithstanding these judicious observations, further trials are wanting with respect to the best modes of draught.

Hay Cart, a cart made use of for conveying hay from the field; it is constructed in the same way as that made use of for corn. See *Corn Cart*.

Quarry Cart, is a stiff, strong sort of cart, employed in quarries. Carts for this purpose are variously constructed, according to the nature of the materials to be conveyed by them. When flat stones of great length and breadth are to be carted, they should be low, for the convenience of loading and unloading, and at the same time very firmly put together.

It is stated in the Agricultural Survey of the County of Perth, that “Mr. Mylne, of Mylnfield, employs a cart of a particular construction in his quarry of Kingoodie, which merits the attention of those who have works of a similar nature. This cart has a bend in the axle, which brings it within fourteen inches of the ground, although moving on wheels more than five feet high. The ease with which it is drawn, loaded, and unloaded, is superior to the common cart, in the proportion of 7 to 3.” It is seen at *fig. 9*. in *Plate III*. He also uses in this quarry “a cart for carrying very large stones, such as mill-stones, &c. which is drawn as easily upon wheels of two feet two inches in height as upon wheels of a greater diameter. In this cart the axle is only about five feet long, so that the wheels run under the body of the frame, which is flat, and may be made of any breadth or length required.”

Single horse Cart, that light sort of cart in which only one horse is employed. The term is made use of to distinguish them from those of the large kind, in which three, four, or even a greater number of horses are made use of. Carts of this small construction are extremely useful for all the various little purposes of cartage about the farm, as has been fully shewn above. See *figs. 3. 7. and 8.* in *Plate III*.

Three wheel Cart, a kind of cart that is constructed with three wheels, one being commonly placed in the middle, before, and generally of a smaller size. Carts of this sort are mostly close, and used when great quantities of earth or other materials are to be conveyed at once to some distance.

CARTS, laws relating to. By 13 Geo. III. c. 78. no cart, having the sole or bottom of the fellys of the wheels of the breadth of nine inches, shall be drawn with more than five horses; and no cart, having the said sole the breadth of six inches, shall be drawn with more than four horses; and those of less breadth than six inches shall not be drawn with more than three horses, under a penalty on the owner of 5l., and on the driver (not being the owner) of 10s. for every horse above the stipulated number: the information to be laid within three days and the action commenced within one calendar month after the offence committed. Exceptions are admitted in favour of carriages, moving upon wheels or rollers of the breadth of 16 inches on each side, with flat surfaces, and such as justices allow by licence to be drawn up steep hills, or on roads that are not turn-pikes, or in deep snow or ice, or carrying any one stone, block of marble, cable rope, piece of metal, or ammunition and artillery for his majesty’s service. Two oxen or horned cattle are considered in the contemplation of this act, as one horse. Moreover it is enacted by 6 Geo. I. c. 6. that no person in London and Westminster, or within

10 miles, shall carry at one load in carts or waggons having their wheels shod with iron, more than 12 sacks of meal of five bushels each, nor more than 12 quarters of malt, nor more than 750 bricks, nor more than one chaldron of coals, on pain of forfeiting any one of the horses, with geers, bridles, &c. And by 18 Geo. II. c. 33. wheels of every cart, car, or dray, within the bills of mortality, shall be six inches broad in the felly, and not wrought about with iron, nor be drawn with more than three horses, after they are up the hills from the water-side, under a penalty of 40s.; but this act does not extend to any country cart or waggon, that shall bring any goods, or shall carry any goods half a mile beyond the paved streets of the said cities and places. Any person, within the said limits, using any cart, car, or dray, having the wheels full six inches broad, when worn, may have the same bound round with tire of iron, provided it be six inches broad, and made flat, and not set on with rose-headed nails. No person shall drive any cart, within the said limits, unless the name of the owner, and number of such cart, &c. be placed in some conspicuous place of the cart, &c.; and his name be entered with the commissioners of hackney-coaches, under the penalty of 40s. and every person may seize and detain such cart till the penalty be paid. On changing property, the names of the new owners are to be affixed, and to be entered with the commissioners of hackney-coaches, 30 Geo. II. c. 22. And stat. 24 Geo. III. ft. 2. c. 27. compels the entry of all carts driven within five miles of Temple-bar. By 13 Geo. III. c. 78. §. 11. a person, who leaves any cart or other carriage, &c. in any high-way, beyond the reasonable time allowed for loading or unloading, so as to obstruct the passage of any other carriage, &c. shall forfeit 10s. By 1 Geo. stat. 2. c. 57, by 24 Geo. II. c. 43, and, more generally, by 13 Geo. III. c. 78, it is enacted, that if the driver of any cart, car, dray, or waggon, shall ride upon any such carriage in any street or highway, not having some other person on foot or on horseback to guide the same (such carriages as are conducted by some person holding the reins of the horse or horses drawing the same excepted);—or if the driver of any carriage whatsoever, on any part of any street or highway, shall by negligence or wilful misbehaviour cause any hurt or damage to any person or carriage passing or being upon such street or highway;—or shall quit the highway and go on the other side of the hedge or fence inclosing the same; or wilfully be at such distance from such carriage, whilst it shall be passing upon the highway, that he cannot have the direction and government of the horses or cattle drawing the same: or shall, by negligence or wilful misbehaviour, prevent, hinder, or interrupt the free passage of any other carriage, or of his majesty's subjects, on the said highways; or if the driver of any empty or unloaded waggon, cart, or other carriage shall refuse or neglect to turn aside and make way for any coach, chariot, chaise, loaded waggon, cart, or other loaded carriage; or if any person shall drive, or act as the driver, of any such coach, post chaise, or other carriage let for hire, or waggon, wain, or cart not having the owner's name (as by this act is directed) painted thereon, or shall refuse to discover the true christian and surname of the owner of such respective carriage; he shall on conviction by confession, view of the justice, or oath of one witness, before one justice, forfeit any sum not exceeding 10s., in case such driver be not the owner of such carriage; and if he be the owner, then any sum not exceeding 20s.; and in default of payment be committed to the house of correction for any time not exceeding one month, unless the same be sooner paid. And every such driver offending in either of the said cases, may by authority of this act, with or without

any warrant, be apprehended by any person who shall see such offence committed, and shall be immediately conveyed or delivered to a constable or other peace officer, to be conveyed before a justice, to be dealt with according to law. And if any driver, in any of the cases aforesaid, shall refuse to discover his name, the justice may commit him to the house of correction for any time not exceeding three months, or may proceed against him for the penalty by a description of his person and the offence, and expressing in the proceedings that he refused to discover his name.

And for the better discovering of offenders, the owner of every waggon, wain, or cart, and also of every coach, post chaise, or other carriage, let to hire, shall cause to be painted, upon some conspicuous part of his waggon, wain, or cart, and upon the pannels of the doors of all such coaches, post chaises, or other carriages, before the same shall be used in any public highway, his christian and surname and place of abode, in large legible letters; and continue the same thereupon so long as such carriage shall be used upon any highway: and the owner of every common stage waggon or cart shall, over and above his christian and surname, cause to be painted on the part and in the manner aforesaid, the following words, *common stage waggon or cart*, as the case may be. And every person using any such carriage as aforesaid upon any highway, without the said names and descriptions respectively, or causing to be painted thereon any fictitious name or place of abode, shall forfeit not exceeding 5l. nor less than 20s.

"Taxed carts," constructed, kept, and used under the regulations of the stat. 43 Geo. III. c. 99, are exempted from the annual duty of 5l. 5s. charged for carriages with less than four wheels and drawn by one horse. Such carriages are thus described: they shall be built wholly of wood or iron, without any covering other than a tilted covering, and without any lining or springs, made of iron, wood, leather, or other materials, and with a fixed seat, without slings or braces, and without any ornament whatever, other than paint of a dark colour, for the preservation of the wood or iron only, and which shall have the words "a taxed cart," and the owner's christian and surname and place of abode, marked or painted on a black ground in white letters, or on a white ground in black letters, on the outside of the back pannel or back part of such carriage, in words at full length, and of a breadth in proportion, and the price of which (repairs excepted) shall not have exceeded, or the value thereof shall not at any time exceed the sum of 12l. sterling. For such a carriage kept by any person for his own use, and not for hire, the annual duty to be paid is 1l. 4s. The exemption from all duties specified in the fore-said act extends to any cart kept to be used wholly in husbandry, or in the carriage of goods in the course of trade, and whereon the name and residence of the owner, and the words "common stage cart" shall be legibly painted; although the owner, or his or her servant, shall occasionally ride therein or thereon when laden, or when returning from any place to which, or when going to any place from which any load shall have been or shall be to be carried in such carriage, or for conveying the owners thereof or their families to or from any place of divine worship on Sunday, or on Christmas-day, or on Good Friday, or on any day, appointed for a public fast or thanksgiving, or for carrying persons going to or returning from the election of members to serve in parliament.

CART, in *Artillery*. See CARRIAGE.

CART^{bote}, in our *Ancient Customs*, denotes wood to be employed in making or repairing instruments of husbandry.

CART-ladder, a kind of rail or rack, placed occasionally at the head, sides, and tail of a cart to make it hold a larger quantity of hay, straw, or other similar bulky material. Rails of this sort are framed and made very strong.

CART-lodge, a small out-house for sheltering carts from the weather. Farmers should be very careful to place their carts, &c. under proper shelter, when out of use, as they will last much longer by this means than if left exposed in the yard to the effects of the weather; for, as they are thus sometimes wet, and sometimes dry, they soon rot, and become unfit for use. The dust and nastiness should also be constantly washed off before they are laid up in these places. These sheds should always be as close to the farm yards as possible, for the sake of convenience.

CART-rake, a provincial term applied to the cart-track, or furrow made by the wheels of the cart.

CART-rut, the track made by the wheels: it is the same with cart-rake.

CART-wright, a name applied to a person whose business it is to make carts, waggons, &c. generally called a wheelwright.

CART-water, in *Geography*, a river of Scotland, which runs into the Clyde, 3 miles N. of Paisley.

CARTA, *Ital.* literally means paper; but it is used in *Music* for a folio, a leaf, or page of musical characters.

CARTA, in *Ancient Geography*, a town of Asia, in Hircania, according to Strabo.

CARTAGO. See **CARTHAGE**.

CARTAGO Nova. See **CARTHAGENA**.

CARTAGO, in *Geography*. See **CARTHAGO**.

CARTAL, a town of European Turkey, in Bessarabia, situate on the Danube; 28 miles W. of Ismael.

CARTAMA, a town of Spain, in the province of Grenada, seated on an eminence; 4 leagues N.W. of Malaga.—Also, a town of Spain, in the province of Grenada, 6 leagues S.W. of Alhama.

CARTE, **THOMAS**, in *Biography*, a learned and laborious English historian, was the son of the Rev. Samuel Carte, vicar of Clifton upon Dunsmoor, in Warwickshire, and born there, or at least baptized there by immersion, on the 23d of April, 1686. In 1698, soon after he had entered the 13th year of his age, he was matriculated in the university of Oxford, and he was afterwards incorporated at Cambridge, where he took his degree of master of arts in 1706. Having entered into holy orders, he became reader of the abbey-church at Bath; and in consequence of a sermon, preached on the 30th of January 1713-14, and vindicating the character of king Charles I. from the aspersions cast on his memory with regard to the Irish rebellion, he was engaged in a controversy with Mr. Chandler, a dissenting minister at Bath and father of the celebrated Dr. Samuel Chandler. This controversy occasioned his first publication, entitled "The Irish Massacre, set in a clear Light, &c.;" which was afterwards inserted in "Somers's Tracts." On the accession of George I. he scrupled taking the oaths to the new government, and assumed a lay habit. In 1715 he was suspected of being concerned in the rebellion, and in order to elude orders that were issued for apprehending him, he was for some time concealed in the house of a clergyman at Colehill. Whilst he afterwards acted as secretary to bishop Atterbury, he incurred suspicion of being a party in the conspiracy attributed to that prelate, and being charged with high-treason in 1722, a reward of 1000*l.* was offered for seizing his person. He fortunately escaped to France, and resided in that country several years under the name of Philips. At this time

he had access to many persons of learning and rank, and to several libraries, and thus had an opportunity of collecting materials for an intended English edition of the history of Thuanus. His collections were purchased by Dr. Mead, and employed in Buckley's splendid edition of that work, which appeared in 1733. By the interest of queen Caroline he obtained permission to return to his own country, and soon after engaged in his important work, "The History of the life of James duke of Ormonde" comprised in 3 vols. fol. and published in 1735-36. This work contained useful materials with respect to the history of those times, and particularly relating to the affairs of Ireland, of which Dr. Leland and other writers have availed themselves; but as it displayed the author's attachment to arbitrary principles of government, it raised his reputation with the tory party. As he and those with whom he was more immediately connected disapproved the principles of Rapin's History of England, and thought it chargeable with many errors, he announced his intention of writing a new history; and having, in 1738, printed an account of the materials as well as the encouragement that were necessary for the completion of his plan, he obtained subscriptions, or reason to expect them, to the amount of 600*l.* per annum. Accordingly he commenced his researches in the libraries of Cambridge, resided for some time in the house of Sir John Hinde Cotton, and employed himself in arranging his large collection of pamphlets and journals. In 1744, when the Habeas Corpus act was suspended on account of apprehensions from the Pretender, Carte was again suspected, and being taken into custody underwent an examination; but as no evidence appeared against him, he was soon discharged. Deriving from this circumstance additional encouragement to prosecute his history, and a handsome subscription from the city of London, voted by the common council, as well as from some of the London companies, he was enabled to complete the first volume in folio, terminating with the death of king John, towards the close of the year 1747; but the introduction of an absurd story concerning a man who went from Somersetshire in 1716 to Avignon to be touched by the Pretender for the king's evil, and who was said to have been cured, evinced his credulity and want of judgment to such a degree, that his history sunk into disrepute, and the author was disappointed with regard to several subscriptions which he had reason to expect. However, he persevered, and published two additional volumes in 1750 and 1752; and the fourth, which was posthumous, appeared in 1755, and he continued the history to 1654. In this history, which in point of style is indifferently written, much useful information, procured by indefatigable researches, is blended with inveterate prejudice. Mr. Carte was the author of various other works, which are chiefly compilations, collections, and translations. The most considerable is "A catalogue of Gascon, Norman, and French Rolls preserved in the Tower of London," printed in French at Paris, in two vols. fol. 1743. He died at Caldecot house, near Abingdon in Berkshire, on the 2d of April, 1754. His papers are deposited in the Bodleian library; and they have been perused by the earl of Hardwicke, and also by Mr. Macpherson, who availed himself of them in the compilation of his History and State papers. Mr. Carte was a man of strong constitution, indefatigable in his application to study, negligent with regard to his outward appearance, but when the labours of the day were closed, fond of society, and in conversation cheerful and entertaining. He left a widow, but no children. Nichols's Anecdotes of Bowyer. Biog. Brit.

CARTE, in *Fencing*, denotes a thrust with a sword at the inside of the upper part of the body, with the nails of the sword

sword hand upwards. *Low carte* is a thrust at the inside of the lower half of the body; the position of the hand being the same as in the former.

CARTE Blanche, a French term, seldom used but in this phrase, 'To give, or send any one the *carte blanche*; i. e. to send him a blank paper, signed, for him to fill up with what conditions he pleases. Much like this is the French *blanc signe*, a paper without writing, except a signature at the bottom, given by contending parties to arbitrators, or common friends, to fill up with the conditions they judge reasonable, in order to end the quarrel.

CARTE Blanche, in *Military Language*, is an absolute power or authority given by a sovereign to a general of his army to do whatever may appear to him most proper or advisable without waiting for order from his court; or it is permission granted to a general to act in conformity to his own will, his knowledge, intelligence, and information, and according to circumstances, without specific orders from his chief. A general in consequence of such a power conferred on, and confidence reposed in him, may attack his enemy in point both of time and manner as he thinks fit, without having either received a particular fresh order, or waiting for any.

In ancient times the general of an army had commonly the power of executing, with the troops under his command, his own plans and designs. The Grecian, Roman, and Carthaginian generals had almost always a *carte blanche*. But they were answerable to their respective governments for their want of success, and they rarely escaped punishment as criminals when they were unsuccessful. And even the excusing of them from banishment was a favour, or indulgence, which was regarded as a mark of disgrace or dishonour. In modern times the republics of Venice and Geneva have particularly afforded examples of this severity even towards generals who had gained many victories, and had rendered essential service to those states; from which it may fairly be inferred, that the general who accepts a perfect *carte blanche*, is at least imprudent, if he is not ambitious.

The Ottoman history also furnishes several instances of generals strangled on their return from campaigns for having been unsuccessful, or defeated.

Seignior de Gordes, governor of Picardy, having engaged at Guinegale, without the orders of the court, the archduke Maximilian of Austria, Louis XI. was so vexed on being informed, that though his troops had at first the advantage in the action, they at last lost it by betaking themselves to pillage, that he determined his generals should afterwards undertake nothing of consequence without express orders. Since the time of that prince, the kings of France, who have indeed been generally themselves at the head of their armies, have not granted a *carte blanche* but very rarely, and only to generals whose valour and abilities have been frequently tried and acknowledged.

As most of our expeditions are carried on at a great distance from this country, it is perhaps more necessary for those generals who command them to have a discretionary power of acting, than it is for those of any other nation. But none should be invested with such authority, or entrusted with the command and management of such distant expeditions but men of approved knowledge, discretion, and capacity. Had a general of talents been employed with a sort of *carte blanche* at the beginning of the American war, commonly called the American rebellion, he would probably have settled it completely in the course of a few months.

The king being generalissimo of all his forces may grant a *carte blanche* to such of his generals as he either knows, or

supposes to possess great prudence and superior talents. In like manner the general of an army may give a *carte blanche* to a general officer commanding a division of the same. When a general possesses all the talents and qualifications necessary for his situation or employment, his sovereign ought to confer on him this power or authority in order to prevent the want of it from retarding, embarrassing, or crippling his operations. It is necessary indeed that every general should have a discretionary power of acting to a certain degree. One of the great advantages, which a king capable of commanding his own armies enjoys, is that of doing what he chooses, and when he chooses, without losing occasions and opportunities of acting by waiting for orders. It is for the same reason useful and advantageous for a sovereign to be present with his army, if he even have not the talents necessary for commanding it. For then orders are obtained promptly and expeditiously. Intrigue and jealousy have not time to operate and produce their baneful effects: and the general has it more in his power to guard himself against them.

In engagements, the commander of an army ought to give only concise and general orders, leaving a sort of *carte blanche*, or discretionary power of acting with all his generals as to matters of detail. For in every action there is almost an infinite number of circumstances, which neither the commander himself nor the generals under him can foresee, that require sudden changes of disposition and prompt movements, which every general should have it in his power to direct, and cause to be made without waiting for orders.

CARTE géographique of Argenville, in *Conchology*, the map cowry, *CYPRÆA mappa*.

CARTE géographique, *Fauve*, in *Entomology*, the trivial French name of the European kind of butterfly, called by Linn. and Fabr. *papilio prorsa*.

CARTEIA, in *Ancient Geography*, *Rocadillo*, a town in the southern part of Bætica. Some difference of opinion has subsisted about its precise situation; but the researches of ingenious geographers lead us to conclude, that it was seated at the bottom of the bay of Gibraltar, and that it was called "Tartessos" by the Greeks, though the Latins transferred this name to Gades. Some authors have confounded it with "CALPE," which was at the extremity of the mountain. Strabo says that it had been founded by Hercules, and that it had formerly been called "Heraclea." This city suffered much when Cæsar pursued the army of the son of Pompey, defeated at Munda. Carteia, it is said, subsisted till the arrival of the Moors; and the town, now called Castillon, is said to be the remains of Carteia.

CARTEIA, a town of Spain, in Celtiberia, called by Polybius Althæa.

CARTEL, in *Military Language*, is a particular agreement, or convention between two belligerent powers, and has commonly for its objects the exchange or ransom of prisoners, and the mutual delivering up of each others' deserters at certain times, and under certain conditions.

There are also cartels agreed on or settled between princes in time of war, for carrying on commerce without interruption, notwithstanding hostilities.

Cartel originally signified a *placard*, or manifesto in writing, posted in public places, for the purpose of notifying, or announcing its contents.

It comes from the Italian word *cartello*, or the Latin word *cartellus*, both of which have the same signification, being diminutives of *charta*, signifying *paper*.

The term *cartel* has also been made use of to denote the agreement or convention which contained the rules or regulations, that were to be observed by the knights, or chevaliers

valiers who jousted and combated at a tournament, or carrousal.

This name is likewise given to the billet, or note of challenge which the person offended or insulted sends to the aggressor, desiring him to meet him at the place and time appointed to give him satisfaction, and settle their quarrel by single combat.

This term has also been often employed to signify a letter of defiance, or challenge to single combat. Such letters were in frequent use, when under the feudal system combats of this nature were not only practised, but were sanctioned and enjoined by princes, and even by bishops and the dignified clergy as the best method of settling difficult points of law and controversies that could not easily be otherwise determined. Such challenges, or letters of defiance, were not always confined to single combats. They sometimes extended to small bodies of men of an equal number on each side, and sometimes even to armies. Rymcr gives the cartel which Edward III. sent to Philip de Valois challenging him to fight him within ten days before the gates of Tournay, either body to body, or one hundred men to a hundred men, or army to army.

Challenges of this nature, however, took place long before the existence of the feudal system, and as far back indeed as either history or poetry carries us. For instances of them are to be found in Homer, Virgil, and other Greek and Latin poets, as well as in their historians.

Cartel is also a term used to denote a ship commissioned in time of war for exchanging the prisoners of any two belligerent powers, or for carrying a request or proposal from one to the other. The officer who commands her is permitted to carry a single gun only for the purpose of firing signals.

Cartel likewise denotes a measure of capacity for corn in divers parts of France, varying in different places.

CARTENAGA, in *Ancient Geography*, a town of India, placed by Ptolemy on this side of the Ganges.

CARTENNA, or CARTENNÆ, a very considerable city of Africa, in Mauritania Cæsariensis, or the western province of the kingdom of Algiers, called Tlemcen, or Tremecen, situated near the mouth of the river Cartennus, to the north-east, and S.S.W. of that of the river Chimalaph, or Shelliff. Pliny and Ptolemy mention it. It was a Roman colony, and Augustus settled in this place the soldiers of the second legion. Its situation corresponds to that of Musty-gannim, or Mostagan, and also of Masagran. The strength and beauty, says Dr. Shaw, (*Travels*, p. 16.) of the walls of Musty-gannim to the N.W. may well allow us to suppose them to have been formerly a portion of some Roman fabrick. For both Musty-gannim and Masagran are so copiously supplied with water; they are so commodiously situated with regard to the fertile and extensive lawns that are spread far and near behind them; they enjoy, besides, such a delightful prospect of the sea, and of the rich maritime country that lies in view, to a great distance, on each side, that, without doubt, they were stations too valuable to have been neglected by the Romans. Pliny and Ptolemy place their Cartenna in this direction; and in the *Itinerary* we have the same distance betwixt Arsenaria and Cartenna that is found betwixt Arzew and these places. One or other of them, or both, might have formerly made up this colony: for, considering that their situations are nearly contiguous, and that the interjacent plantations belong indifferently, as perhaps they always did, to both of them, there is some probability at least that they had likewise the same interest, and were accordingly one and the

same community, under the name Cartennæ, as it is written in the plural by Ptolemy. See MOSTAGAN.

CARTENNUS, a river of Africa, which discharges itself into a gulf of the Mediterranean Sea, N.E. of the port of Arsinaria. It is now, as Dr. Shaw suggests, the *Halrah*, which see.

CARTER, in *Geography*, a new county in the state of Tennessee, in North America, formed of a part of the county of Washington.

CARTERET, JOHN, earl Granville, in *Biography*, an eminent statesman, was born in 1690, and educated at Westminster school and Christchurch college, Oxford, from which seats of learning he derived a great degree of classical knowledge, and also high principles of government, and a fondness for convivial pleasures, which marked the progress of his life. Upon being introduced into the House of Peers, in 1711, he distinguished himself as a zealous advocate for the Hanover succession, and was successively advanced by king George I. to several posts of honour. As a forcible and eloquent speaker, he strenuously supported the measures of administration during that reign. In 1719 he was deputed as ambassador extraordinary and plenipotentiary to the queen of Sweden, and negotiated the peace between that crown and Denmark, which terminated the troubles of the north of Europe; and in 1721 he was appointed secretary of state, which gave him an opportunity of vigorously defending the boldest measures of the existing administration. Having accompanied the king to Hanover in 1723, he was, on his return, in the following year, appointed lord lieutenant of Ireland, and exerted himself in composing the disturbances in that country, which had been fomented by Swift's famous Drapier's letters. When Swift expostulated with him for his prosecution of the printer of those letters, he replied in a line of Virgil, no less appropriate as an apology for many measures of that reign, "*Regni novitas me talia cogit moliri*," i. e. The unconfirmed state of the throne compels me to make use of these means. After his return to England, in 1726, he continued his firm support to the government. After the accession of George II., in 1727, he again occupied the vice-royalty of Ireland, and conducted the affairs of government till the year 1730, in a manner that conciliated contending parties. On this occasion, Swift wrote an humorous vindication of his lordship from the charge of favouring none but tories, high church-men, and jacobites. After his return to England, he joined the opposition to sir Robert Walpole, and in the parliamentary contest with his ministry, adopted maxims and language very different from those which he had avowed and used, whilst he himself was a member of administration. Having at length succeeded, in connection with his coadjutors, in procuring the dismissal of Walpole in 1742, he became secretary of state, and supported measures similar to those which he had been lately censuring. In 1744, upon the death of his mother, he succeeded to the titles of viscount Carteret and earl Granville. After a course of various political changes, he closed his life the 2d of January, 1763, in the 73d year of his age. Although he possessed distinguished talents and acquirements, his temper was so ardent and overbearing, that he was fitter for being the minister of an absolute monarch than of a limited sovereign. Ambitious, and fond of sway, he was neither mercenary nor vindictive; and the elevation and fertility of his genius were equalled by his confidence and presumption; so that he is said never to have doubted. Learned himself and an encourager of literature, he particularly patronized Dr. Taylor, the celebrated Grecian, and Dr. Bentley. In social life he was pleasant, good-humoured, frank, and bacchanalian. *Biog. Brit.*

CARTERET, in *Geography*, an island in the Southern Pacific Ocean, discovered by captain Carteret in August 1767. S. lat. $8^{\circ} 26'$. E. long. $154^{\circ} 14'$.

CARTERET, a maritime county of Newbern district, in the state of North Carolina, in North America, on Core and Pamlico sounds. It contains 3732 inhabitants, including 713 slaves. Its chief town is Beaufort.

CARTERET Harbour, a bay on the south-east coast of New Ireland. S. lat. $4^{\circ} 48' 40''$. E. long. $152^{\circ} 45' 40''$. This harbour forms a sort of basin, where the clouds, loaded with water, after passing over the high mountains of New Ireland, experience a calm, which prevents the air from supporting them. To this circumstance are owing those excessive rains, which render the anchoring-place far from desirable to navigators. Nevertheless, this harbour furnishes plenty of good water, which may be procured with great facility: but the wood obtained in this place introduces into the ships a prodigious number of scorpions and scolopendæ, of the species called "scolopendra morfitans," which are very troublesome. This harbour affords no refreshments. The tides take place once a day, and rise only about six feet. The thermometer, observed at noon in the middle of July, varied from 19° to 21° ; and the barometer from 28 inches $1\frac{2}{5}$ th line to 28 inches $1\frac{1}{5}$ th line. Voyage in search of La Perouse, vol. i.

CARTERET Point, the N.W. extremity of the island of Egmont, in New Guernsey. S. lat. $10^{\circ} 42'$. E. long. $163^{\circ} 50'$.

CARTERIA, in *Ancient Geography*, an island of Asia Minor, near Smyrna, according to Pliny.

CARTEROMACO, or CARTEROMACHUS, SCIPIO, in *Biography*, a learned Italian, whose proper name was *Fortiguerra*, was born at Pistoia in 1467; and having studied in his native city at a college founded by his family, at Rome, and at Florence, where he learned Greek under Angelo Poliziano, and having passed some years at Padua, he was appointed by the republic of Venice, in 1500, with a liberal salary, to teach the Greek language to the Venetian youth. Upon an invitation to Rome by pope Julius II. he was placed by this pontiff with his nephew, cardinal Galeotti de la Rovere; and upon the death of this cardinal, he attached himself to cardinal Francis Alidosio, who was killed at Ravenna in 1511. His next patron was cardinal John de Medici, afterwards pope Leo X.; but his rising expectations were suddenly frustrated by death, at the age of 46, in 1513. Scipio was equally distinguished for modesty and learning; and both these qualities are ascribed to him in a very eminent degree by Erasmus (Epist. 471.), who consulted him and Marcus Musurus upon such difficulties as occurred to him in the explication of Greek proverbs. His principal works are, "A Latin Oration in praise of Greek learning," Venice, 1504; "A Latin Translation of the Greek Oration of Aristides in praise of the City of Rome," Venice, 1518; "An Edition of Ptolemy's Geography," Rome, 1507; and various prefaces, epigrams, and letters in Greek and Latin, inserted in other publications. Gen. Dict. Tiraboschi.

CARTERON, or CARTERUM, in *Ancient Geography*, a town of Asiatic Sarmatia, situated on the coast of the Euxine sea, according to Ptolemy.

CARTES, RENÉ DES, in *Biography*, an eminent philosopher, and founder of a numerous sect, called *Cartesians*, was a native of France, the descendant of an ancient and noble family, and born at La Haye in Touraine, on the 31st of March in 1596. As he discovered in his infancy an eager curiosity to inquire into the nature and causes of things, his father called him "the Philosopher," and placed him, at the early age of 8 years, under the tuition of a relation in the Jesuits' college

at La Fleche, where he made an uncommon proficiency in the learned languages and polite literature, and formed an intimate acquaintance with several persons, who afterwards became eminent in the republic of letters, particularly with Merfenne. After spending 5 years in the diligent study of languages, and in reading the ancient poets, orators, and historians, he directed his attention to mathematics, logic, and morals; but disapproving the mode in which these sciences, and more especially the two latter, had been usually taught, he formed a plan of study for himself, and sketched out a concise system of rules or canons of reasoning, in which he followed the strict method of the geometricians. Dissatisfied, however, with the course of study which he was pursuing, he left the college at the close of 8 years, and returned to his parent, lamenting that he had derived no other benefit from his past application than a fuller conviction that he had hitherto known nothing with perfect clearness and certainty. He therefore determined to throw aside his books, and to seek knowledge in the study of himself and of the great volume of nature. Having spent some time in the city of Rennes, where he employed himself in learning to ride and fence, and other exercises preparatory to a military life, he proposed to devote himself to the profession of a soldier; but his constitution being feeble and unfit for the fatigues of this kind of life, his father sent him to Paris in 1613, and confiding in his discretion, left him to his own uncontrolled direction. Here the love of pleasure and a propensity to gaming would probably have wholly diverted his attention from the pursuits of literature, if he had not fortunately renewed his acquaintance with Merfenne, and other learned persons, who reclaimed him from the frivolity and folly to which his time was devoted, and engaged him to renew his application to the study of mathematics, which he prosecuted in retirement for the space of about 2 years. But still unsteady in his purpose, and dissatisfied with the result of his speculations, he again laid aside his books, and determined to embark in the military profession, under a notion that he should thus enjoy favourable opportunities for gaining a knowledge of the world. Accordingly he departed for Holland in 1616, and entered himself as a volunteer in the Dutch army. Whilst he regularly performed his military duty, he spent his intervals of leisure in study; and during the encampment of the army at Breda, he solved a problem in mathematics to the satisfaction of Beekman, an eminent mathematician, principal of the college of Dort, and he also wrote a treatise on music, which was printed at Utrecht in 1650, 4to., and at Amsterdam in 1656, 4to., under the title of "Compendium Musicæ," of which an English translation was published at London in 1653. During his stay at Breda, he also laid the foundation of several of his works, and is said to have composed a philosophical dissertation, in which he attempted to prove that brutes are automata, or mere machines. See BRUTES. In 1619 he quitted the Dutch service, and entered as a volunteer in the army of the duke of Bavaria. Whilst he remained in winter-quarters, he had many intervals of solitary leisure, which he employed in a course of meditation upon important subjects; and as he was still perplexed with doubts and difficulties, he had recourse for satisfaction to the Rosicrucians, who boasted of divine inspiration; but failing to find any one who could unfold to him the mysteries of this sect, he returned from his short excursion into the regions of enthusiasm to the humble path of rational inquiry, and preferring the society of learned men to that of his military comrades, he appeared more like a philosopher than a soldier. Having been present at several sieges, and having, in 1621, made the campaign in Hungary, under the count de Bucquoy, who was killed that year, he abandoned

abandoned the military profession; and after a tour through the northern parts of Germany, he returned, in 1622, to his own country, with no other profit from his travels, as he himself confesses, than that they had freed him from many prejudices, and rendered his mind more fit for the reception of truth. Some time after he fixed his residence at Paris, where he cleared himself from the imputation of being a Rosicrucian, and applied to the study of mathematics, with a view of discovering general principles of relation, measure, and proportion, applicable to all subjects, by means of which truth might be investigated with certainty, and the boundaries of knowledge enlarged. But not succeeding to his wishes, he turned his attention to ethical inquiries, and attempted to raise a superstructure of morals on the foundation of natural science; being of opinion, that the best means of discovering the true principles and rules of action, is the contemplation of our own nature, and the nature of the world around us. This investigation in course of time produced his treatise "On the Passions," or "*Traité des Passions de l'Âme*," written in 1646 for the use of the princess Elizabeth of Bohemia, and printed several times in 12mo. viz. in 1650 at Amsterdam, in 1651 at Rouen, and in 1664 and 1679 at Paris. A Latin translation of it was published at Amsterdam in 1656 and 1664 in 4to. From the physical nature of the passions he deduces his principles of morals; and his doctrine on this subject is as follows: "Whatever happens, is called passion, with respect to the subject to which it happens; and action, with respect to that which causes it to happen. Nothing acts upon the mind more immediately, than the body to which it is joined; whence what is passion in the mind, is action in the body. Heat, and the motion of the limbs, proceed from the body, and thoughts from the mind; but the mind cannot give motion and heat to the body. The more vivid and subtle parts of the blood, which heat rarifies in the heart, are incessantly entering into the cavities of the brain, and form animal spirits, which are in the brain separated from other less subtle parts of the blood. These animal spirits, which are corporeal, excited as by the soul itself, so also by the action of external objects upon the senses, are the immediate cause of all the original motions of the body. Whence all the limbs may be moved by means of the objects of sense, and the animal spirits, without any action of the soul. Nothing is to be attributed to the soul but thoughts: and these are of two kinds; active, or volition, including desire and aversion; and passive, including intelligence, perception, and feeling, or passion.

"The soul is united to all the parts of the body, but its chief functions are exercised in the pineal gland of the brain, where it receives notice of the impressions made upon the senses, and whence it sends forth animal spirits through the nerves, which put the muscles into motion. The passions are feelings of the soul, produced and continued by the action of the animal spirits; the chief effect of the passions is, to excite the soul to volition. All volition is in its nature free, and consists in causing the gland, with which it is intimately connected, to move in that manner which is most suitable to produce an effect corresponding to the volition. Judgment comprehends not only the perception of the understanding, but the assent of the will, and it is from the abuse of its natural liberty of assenting or not assenting to a proposition that error springs. The soul, in the act of recollection, exercises a volition by means of which the pineal gland inclines itself successively this way and that way, and impels the animal spirits to different parts of the brain, till that part is found upon which the object which we wish to recollect has left traces.

"The soul of man, which is one, is both sensitive and rational; and the conflict between its inferior and superior parts is nothing else but a struggle between the motions which the body, by means of its animal spirits, and the soul, by its own volition, are at the same time endeavouring to excite in the pineal gland. By the result of this contest, every one may judge of the strength or weakness of his soul. The soul acquires the dominion over the body by means of firm and clear decisions concerning good and evil, produced by the contemplation of truth, which it determines to follow without suffering itself to be seduced by present passion. The passions belong to the body, and are to be impeded to the soul only as it is united to the body. Their use is, to excite the mind to exert those volitions which are necessary to the preservation or perfection of the body, and the attainment of that which is in its nature good. All the passions are useful, and only become injurious by excess. The general remedy against the excess of the passions is, to consider all the appearances which they present to the imagination as deceitful, and to postpone volition and action till the commotion which they have excited in the blood is appeased, or where immediate action is necessary, to follow reason in opposition to passion. Since nothing beyond our own thoughts is absolutely in our own power, it is wiser to endeavour to subdue ourselves than fortune, and to change our own desires than the order of the world."

But to return from this digression. Des Cartes having been employed for some time in the studies above recited, he left Paris, and took a journey to Italy, where he spent about 2 years, conversing with eminent mathematicians and philosophers, and informing himself concerning various objects in natural history. After his return to Paris, he found his studies so much interrupted, and his mind remained in so sceptical a state, that he was unable to pursue any regular plan of life; and, therefore, in 1629, he determined to withdraw to some more retired situation, where, without the intrusion of visitors, he might have leisure to complete his grand design of forming a new system of philosophy. In order to prevent any interference on the part of his friends from diverting him from the execution of his purpose, he left Paris without communicating his intention to any; and none, except his friend Mersenne, knew for some time the place of his retirement. Having transiently visited several towns of Holland, he at last fixed upon Egmond, a pleasant village near Franeker in Friesland, as the place of his stated residence. Here he prosecuted his philosophical labours, and enjoyed the satisfaction of observing how much they engaged the attention of the learned world. In this state of retirement, he employed himself in investigating a proof from reason, independent of revelation, of the fundamental points of religion, viz. the existence of God, and the immortality of the soul, and also in other important metaphysical speculations. The result of these speculations afterwards appeared in his treatise entitled "*Meditationes de primâ Philosophiâ*, &c." and printed at Paris in 1641, 8vo.; a second edition was printed at Amsterdam, in 1642, 12mo. Another edition was published at Amsterdam, in 1719, 8vo. A French translation was printed at Paris, in 1647, 4to.; a second edition appeared at Paris in 1661, 4to.; but the best is the third edition, divided into articles, with summaries, by R. F. i. é. René Fedé, doctor of physic of the faculty of Angers, and printed at Paris in 1673, 4to. Whilst Des Cartes remained in Friesland, he pursued the physical inquiries which he had begun in France; and these researches gave occasion to his "Discourse on Meteors," which he published some years after. After his removal to Amsterdam, he directed his sedulous attention to medicine, anatomy, and chemistry;

and he spent a whole winter in dissecting animal bodies, and in chemical operations. About the year 1630 or 1631, he made a short tour to England; and in the neighbourhood of London he employed himself in observations on the variation of the compass. In the spring of the year 1633 he removed to Deventer, where he completed several works which were left unfinished, and resuming his studies in astronomy, in the summer following he finished his "Treatise of the World," which contained an abridgment of his natural philosophy; but when he heard in what manner Galileo had been treated by the court of inquisition, he was deterred from publishing it, and concealed his opinion concerning the true system of the world. An abridgment of this treatise was published at Paris in 1664, 8vo. under the title of "*Le Monde des Cartes, &c.*" and a correct edition of it in 1677, 4to. at the end of Des Cartes's "*Traité de l'Homme.*" It is printed in Latin in his "*Opera Posthuma.*" The tenets of Des Cartes made their first appearance in the schools at Deventer in 1633, where they were introduced by the professor of philosophy, Henry Renier, a learned man, and an intimate friend of Gassendi. In the following year he returned to Amsterdam, and soon after took a journey into Denmark, and the lower parts of Germany. In 1635 he went to Leewarden in Friesland, where he remained till the year 1637, and wrote his "Treatise of Mechanics," published in Latin in his "*Opera Posthuma.*" In the same year he published his four treatises concerning "Method," "Dioptrics," "Meteors," and "Geometry." These were printed in French at Leyden in 4to. and published at first without his name. The three first were translated some years after into Latin by Curcellæus, which translation was revised by Des Cartes; and they were published under this title, "*Renati Des Cartes Specimina Philosophiæ, &c.*" Amst. 1644, 4to. and 1656, 4to. Van Schooten, professor of mathematics at Leyden, afterwards translated his "Geometry" into Latin, adding his own commentaries and the notes of Mous. de Beaune. This translation, entitled "*Renati Des Cartes Geometria, &c.*" was published at Leyden in 1649, 4to. and with the "*Compendium Musicæ*" at Frankfort on the Mayne in 1695, 4to.

In his treatise of "Method," Des Cartes lays down the following rules for the discovery of truth, which are derived from the practice of geometricians. Nothing is ever to be admitted as true, which is not certainly and evidently known to be so; that is, in judging of truth all prejudice and precipitancy are carefully to be avoided, and nothing more is to be admitted in the conclusion, than what appears to the understanding so distinctly and clearly, that it cannot possibly be doubted. Difficulties must be accurately examined, and divided into so many parts, as may be most convenient for their easy solution. In proving any truth, the ideas are always to be brought forward in a certain order, beginning from things the most simple and most easily known, and advancing, by regular steps, to those which are more complex and difficult. All the parts of a demonstration should be so distinctly numbered, that the relation of each to the whole may be clearly seen, and that it may be certainly known that nothing is omitted.

When the specimen of his philosophy in the above-mentioned four treatises appeared, the number of his followers and admirers increased; and his new doctrine had also many opponents. At Utrecht, Leyden, and Amsterdam, and in other Dutch schools, the Cartesian doctrines were zealously espoused by many learned men; while several theologians, alarmed at the idea of innovation, strenuously opposed them, and even attempted to subject their author to the censure of the civil magistrate. In Great Britain, the Cartesian doctrine

gained such a degree of credit, that sir Charles Cavendish, brother to the earl of Newcastle, invited Des Cartes to settle in England; nor did he appear disinclined to accept the invitation, when he was assured that the king was a Catholic in his heart. Charles I. indeed gave him reason to expect a liberal appointment; but the civil war frustrated this design, and Des Cartes remained in Holland. In his native country his doctrine was at first well received; but a strong party among the Jesuits combined against it; and a violent contest was long kept up between the Jesuits and the Cartesians. In the course of these disputes, Des Cartes himself appeared earnestly desirous of becoming the father of a sect, and discovered more jealousy and ambition than became a philosopher.

In 1641, Des Cartes was invited to France by Lewis XIII. upon very honourable conditions; but no proposal could induce him to quit his retirement. It appears, however, that, during his residence in Holland, he made three visits to his native country, viz. in 1643, 1647, and 1648, and that he was amused with the promise of an annual pension of 3000 livres, which he never received. Having, in 1641, published his "*Meditations,*" which occasioned a controversy with Voet, rector of the university of Utrecht, he afterwards visited France, where he found the edition of his "*Principles,*" and the Latin translation of his essays finished, and the copies sent from Holland. His "*Principles*" were dedicated to his illustrious disciple, Elizabeth, princess palatine daughter of prince Frederic V. elector palatine, and king of Bohemia. The edition of his "*Principles*" was printed at Amsterdam, by Elzevir, in 1644, 4to. under the title of "*Principia Philosophiæ;*" and a French translation, by the abbé Picot, revised by himself, was published at Paris in 1647, 1651, 1658, 4to. An English translation, with remarks, was printed at London in 1653, 4to. This work is divided into four parts; the *first* contains the principles of human knowledge; the *second* treats of the laws of nature, the principles of natural things, the properties of bodies, space, motion, &c.; the *third* contains a particular explication of the system of the world, and more especially of the heavens and celestial bodies; and the *fourth* treats of the earth. In 1645, Des Cartes applied again to anatomy, though he was somewhat diverted from this study by the problem concerning the quadrature of the circle, which was then agitated, and which he declared impossible to be solved. During the winter of this year he composed a small tract against Gassendi's "*Institutes,*" and another "*On the Nature of the Passions.*" About the same time he had a dispute with Roberval concerning vibrations, and he carried on a correspondence with the princess Elizabeth upon moral philosophy. In the year 1647, he was appealed to as an umpire in a dispute between Christina, queen of Sweden, and M. Chanut, the French resident in that kingdom. The question in debate was this: "When a man carries love or hatred to excess, which of these two irregularities is the worst?" On this occasion he drew up the Dissertation upon Love, that is published in the first volume of his letters, which proved highly satisfactory to the queen; though she objected to one passage, which seemed to intimate that the world was not finite. This learned princess, having, by M. Chanut, desired his opinion of the sovereign good, was so much pleased with his answer and with his treatise on the passions, which he sent her, that she expressed a wish to be instructed by him in the principles of his philosophy, and invited him to Sweden. Des Cartes, notwithstanding the apprehended injury that might attend the severity of the climate, accepted the invitation, and arrived at Stockholm in October, 1648. The queen received him with respect, engaged him

to give her instruction every morning at 5 o'clock, and desired him to revise and digest all his unpublished writings, and to draw up from them a complete body of philosophy. The most considerable of them were published after his death. The French edition of his works, published at Paris, comprehends 15 volumes in 12mo. and their contents are as follow; viz. "Lettres de M. Des Cartes, ou l'on a joint le Latin de plusieurs lettres, qui n'avoient été imprimées qu'en François, avec une traduction François de celles, qui n'avoient jusqu'à présent paru qu'en Latin," 1724, 6 volumes. "Les Meditations metaphysiques touchant la premiere philosophie," 1724, 2 vols. "Discours de la Methode, pour bien conduire sa raison, et chercher la verité dans les sciences. Plus la dioptrique, les meteoros, la mecanique, et la musique," 1724, 2 vols. "Les Principes de la Philosophie," 1724, 1 volume. "Les Passions de l'Ame. Le Monde, ou traité de la lumiere. Edition augmentée d'un discours sur le mouvement local et sur la fevre, sur les principes du même auteur," 1728, 1 volume. "L'Homme de René Des Cartes, et la formation du fœtus; avec les remarques de Louis de la Forge," 1722, 1 volume.

Queen Christina earnestly solicited this eminent philosopher to remain in her kingdom, and to assist her in establishing an academy of sciences; and with this view proposed to allow him a revenue of 3000 crowns a year, with an estate which should descend to his heirs and assigns for ever. But Des Cartes had not been more than four months in Sweden, when a cold, which he caught in his early visits to the queen, brought on an inflammation of the lungs, which soon terminated his life, on the 11th of February, 1650, in the 54th year of his age. The queen is said to have lamented his death with tears. His remains were interred, at the request of the French ambassador, in the cemetery for foreigners, and a long historical eulogium inscribed on his tomb. Seventeen years afterwards his bones were carried from Sweden to France, and interred with great pomp in the church of St. Genevieve du Mont, where a magnificent monument, with his bust in basso-relievo, and an appropriate inscription, is erected to his memory.

Des Cartes, as his various writings amply testify, possessed an accurate and penetrating judgment, a fertile invention, and a mind superior to prejudice; qualities which, united with an early acquaintance with ancient learning, and indefatigable industry in the investigation of truth, might seem to promise no inconsiderable share of success in the great design of reforming and improving philosophy. He would have been more successful if he had been less desirous of applying mathematical principles and reasonings to subjects which do not admit of them; if he had set less value upon mere conjectures; and if he had been less ambitious of the honour of founding a new sect in philosophy. See the next article. We shall here subjoin some additional testimonies to his character. M. Baillet, in his account of his life, &c. highly commends him for his contempt of wealth and fame, his love of truth, his modesty, disinterestedness, moderation, piety, and submission to the authority of the church. Dr. Barrow, in his "Opuscula," tells us, that he was undoubtedly a very good and ingenious man, and a real philosopher, and one who seems to have brought those assistances to that part of philosophy which relates to matter and motion, which, perhaps, no other had done; that is, a great skill in mathematics, a mind habituated both by nature and custom to profound meditation, a judgment exempt from all prejudices and popular errors, and furnished with a considerable number of certain and select experiments, a great deal of leisure, entirely disengaged by his own choice from the reading of useless books, and the avocations of life, with

an incomparable acuteness of wit, and an excellent talent of thinking clearly and distinctly, and expressing his thoughts with the utmost perspicuity. Dr. Halley (see Wotton's Reflections upon Ancient and Modern Learning), says, "as to Dioptrics, though some of the ancients mention refraction, as a natural effect of transparent media; yet Des Cartes was the first who, in this age, has discovered the laws of refraction, and brought dioptrics into a science." Wotton (*ubi supra*), though he degrades him in comparison with lord Bacon, whom he soon succeeded, and censures him for too precipitately drawing conclusions without a sufficient number of previous experiments, observes nevertheless, that "to a vast genius he joined an exquisite skill in geometry, so that he wrought upon intelligible principles in an intelligible manner, though he very often failed in one part of his end, namely, a right explication of the phenomena of nature; yet, by marrying geometry and physics together, he put the world in hopes of a masculine offspring in process of time, though the first productions should prove abortive." Dr. Keil, in the introduction to his "Examination of Burnet's Theory of the Earth," animadverting on Wotton's reflections, &c. tells us, that Des Cartes was so far from applying geometry and observations to natural philosophy, that his whole system is but one continued blunder on account of his negligence in that point; which he could easily prove by shewing, that his theory of the vortices, upon which the whole system is grounded, is absolutely false; and that sir Isaac Newton has shewn, that the periodical times of all bodies, which swim in a vortex, must be directly as the squares of their distances from the centre of the vortex. But it is evident, from observations, that the planets, in turning round the sun, observe quite another law; for the squares of their periodical times are always as the cubes of their distances; and, therefore, since they do not observe that law, which they necessarily must, if they swim in a vortex, it is a demonstration that there are no vortices, in which the planets are carried round the sun:—with more to the same purpose. Mr. Baker, considering the natural philosophy of Des Cartes, observes, that, "though it would be very unjust to charge Des Cartes with the denial of a God, who is supposed by him to have created matter, and to have impressed the first motion upon it, yet he is blameable, that after the first motion is impressed, and the wheels set a going, he leaves his vast machine to the laws of mechanism, and supposes that all things may be thereby produced without any further extraordinary assistance from the first impressor. The supposition is impious, and, as he states it, destructive of itself; for, not to deny him his laws of motion, most of which have been evidently shewn to be false, and consequently so must all be that is built upon them, his notion of matter is inconsistent with any motion at all; for, as space and matter are with him the same, upon this supposition there can be no motion in a *plenum*." Dr. Keil condemns Des Cartes for encouraging the presumptuous pride of the modern philosophers; who think they understand all the works of nature, and are able to give a good account of them. Mr. Leibnitz, whilst he acknowledges that Des Cartes was a very learned man, and had read more than his followers imagine, and that he was one of those, who has added most to the discoveries of their predecessors, observes, that those who rest entirely in him, are much mistaken in their conduct; and this, he says, is true, even with regard to geometry itself. He also remarks, that Des Cartes endeavoured to correct some errors with regard to natural philosophy, but that his presumption and contemptuous manner of writing, together with the obscurity of his style, and his confusion, and severe treatment of others, are very disagreeable. Voltaire, in his "Letters concerning

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concerning the English Nation," (Lett. 14.) observes, that nature had favoured Des Cartes with a strong and clear imagination, whence he became a very singular person both in private life, and in his manner of reasoning. This imagination could not conceal itself even in his philosophical writings, which are every where adorned with very brilliant and ingenious metaphors. Nature, says he, had almost made him a poet; and, indeed, he wrote a piece of poetry for the amusement of Christina, queen of Sweden, which, however, was suppressed in honour of his memory. He extended, continues he, the limits of geometry as far beyond the place where he found them, as sir Isaac Newton did after him; and first taught the method of expressing curves by equations. He also applied this geometrical and inventive genius to dioptrics, which, when treated by him, became a new art; and if he was mistaken in some things, it was because a man, who discovers a new tract of land, cannot at once know all the properties of the soil. Those who come after him and make these lands fruitful, are at least obliged to him for the discovery. Voltaire, however, acknowledges, that there are innumerable errors in the rest of Des Cartes's works; and then adds, that geometry was a guide which he himself had in some measure formed, and which would have safely conducted him through the several paths of philosophy; but that at last he abandoned this guide, and gave entirely into the humour of framing hypotheses; and then philosophy was no more than an ingenious romance, fit only to amuse the ignorant. After other appropriate remarks, he concludes with these observations: "He destroyed all the absurd chimeras with which youth had been infatuated for 2000 years. He taught his contemporaries how to reason, and enabled them to employ his own weapons against himself. If Des Cartes did not pay in good money, he however did great service in crying down that of a base alloy." Father Rapin, in his "Reflexions de Physique," after observing that Des Cartes's principles of motion, figure, and extension, are almost the very same with those of Democritus and Epicurus, tells us, that father Merenne mentioned in an assembly of learned men, that Des Cartes, who had gained great reputation by his geometry, was preparing a system of natural philosophy, in which he admitted a vacuum; but the notion was ridiculed by Roberval and some others; upon which Merenne wrote to him, that a vacuum was not then in fashion at Paris, which induced Des Cartes to change his scheme, in compliance to the natural philosophers, whom he studied to please, and admit the plenum of Leucippus; "so that," says father Rapin, "the exclusion of a vacuum became one of his principles, merely from political considerations." Rapin produces no authority for this story; and it should be recollected, that he was a very zealous Aristotelian, extremely prejudiced against any new systems of philosophy.

Des Cartes, it is said, imagined it possible to prolong life very considerably beyond the common period, and thought he had discovered the method of doing it. In conversation with sir Kenelm Digby, Des Cartes assured him that, having already considered that matter, he would not venture to promise to render a man immortal; but that he was very sure it was possible to lengthen out his life to the period of the patriarchs. It seems evident to me, says he, in a letter written to M. de Zuylichem from Egmond, in 1638, when he had attained the age of 42 years, that if we only guarded against certain errors, which we are accustomed to commit in the course of our diet, we might, without any other invention, attain to an old age, much longer and more happy than now we do. However, twelve years after this declaration was made, our philosopher died. Des Cartes was never married, but had

one natural daughter, named Francina, who died at five years of age. Of his works there have been several editions, several of which have been already mentioned.

For an account of the improvements made by Des Cartes in algebra and geometry, see the article ALGEBRA, and Montucla's Hist. Mathem. ubi infra. In reference to the dispute between his friends and those of Harriot, as to the priority of their discoveries, we shall here add, to what occurs under the article just cited, an anecdote told by Dr. Pell, and recorded by Dr. Wallis in his "Algebra." Sir Charles Cavendish, then resident at Paris, had a conversation with M. Roberval concerning Des Cartes's geometry, then lately published, to this purport: "I admire," says Roberval, "that method of Des Cartes, of placing all the terms of the equation on one side, making the whole equal to nothing, and how it occurred to him: the reason why you admire it, said sir Charles, is, because you are a Frenchman; for if you were an Englishman, you would not admire it. Why so? asked Roberval. Because, replied sir Charles, we in England know whence he had it; namely, from Harriot's Algebra. What book is that? says Roberval; I never saw it. Next time you come to my chamber, said sir Charles, I will shew it to you; which, some time after, he did; and, upon perusal of it, Roberval exclaimed with admiration, *Il l'a vu! Il l'a vu!* He had seen it! He had seen it! finding all that in Harriot which he had before admired in Des Cartes, and not doubting that Des Cartes had it from thence. Besides, as Harriot's "Artis Analyticæ Praxis" was published in 1631, and Des Cartes was in England about this time, and as he follows the manner of Harriot, except in the method of noting the powers, it is highly probable that he was more indebted to the English algebraist than his partial advocates are willing to allow. For an account of Des Cartes's philosophy; see the next article. Gen. Dict. Brucker's Hist. of Phil. by Enfield, vol. ii. c. 2. § 6. Montucla, Hist. Math. t. ii. p. 112, &c.

CARTESIAN Philosophy, or CARTESIANISM, the system of philosophy advanced by Des Cartes, and maintained by his followers, the *Cartesians*.

The Cartesian philosophy is founded on two great principles, the one metaphysical, the other physical. The metaphysical principle is this, *I think, therefore I am*. This principle has been attacked and defended, with great spirit, zeal, and partiality on both sides; for though it be true that we are as sure by an inward perception or consciousness, that we exist, as that we think; yet it is true, too, that the conclusion of this reasoning, *I am*, is drawn from the antecedent *I think*; since to think, supposes to be, or exist; and the mind sees clearly the necessary connection between thinking and being.

In order to acquire this fundamental principle, this first and most certain truth in philosophy, Des Cartes recommends to divest the mind of every kind of prejudice, and for this purpose to begin with doubting of every thing. Since the senses err, and dreams deceive, it is first to be doubted, whether sensible objects have a real existence; and we ought also to doubt concerning even mathematical axioms, because we are not sure that we may not have been so formed as to lie under a perpetual deception. But whatever else we doubt of, it is impossible we should doubt, whether we ourselves, who are conscious of exercising the power of thinking, exist. Of such importance, in the estimation of Des Cartes, is this kind of scepticism, that he advises his readers to consider his reasons for doubting of all things, not once only, but to employ weeks, or even months, on these alone, before they proceed any farther. Having established the certainty of our

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own existence, we are next to inquire what sort of beings we are, before we admit the existence of any thing external; and in the prosecution of this inquiry, we perceive belonging to our nature "thought," which has neither extension, figure, local motion, nor any other property which we commonly ascribe to bodies, and of the existence of which we have a prior or more certain knowledge, than of that of any thing corporeal. The mind having thus gained a knowledge of itself, but still doubting the existence of external objects, proceeds in the enlargement of its knowledge, and first finds within itself "ideas," concerning the existence of which, as long as it restricts its contemplation merely to these, without offering or denying any thing like them to exist externally, it cannot be deceived. It also finds within itself certain "common notions," and from these frames various demonstrations, of the truth of which, as long as its attention is directed to them, it is thoroughly persuaded. But because it does not yet know, whether it may not be so formed, as to be deceived in those things which appear most evident, it perceives it to be impossible to admit any certain science, till it has discovered the author of its being. Revolving within itself its various ideas, it finds one of a being supremely intelligent, powerful, and perfect, in which it discovers an existence, not possible and contingent only, as in its ideas of all other things, but necessary and eternal. Since it finds within itself this idea of a supreme being, which could not be a fiction of its own, it concludes with certainty that it must have proceeded from a really existing deity, and consequently that it represents a true and immutable nature, which cannot possibly not exist, that is God. According to this innate idea of Deity, we find him to be eternal, omniscient, omnipotent, the fountain of all goodness and truth, the creator of all things; and as nothing can be an attribute of the divine nature, which implies limit or imperfection, he is, therefore, incorporeal, indivisible, and void of passion, and exercises his understanding and volition, not by continued operations, but by the most simple action. Upon the will of this being, infinitely perfect, and necessarily existing, Des Cartes makes the certainty of self-evident propositions or axioms, as well as of all other necessary truths, to depend. From the knowledge of the cause thus established, he proceeds to deduce a complete knowledge of his effects by necessary steps; and he rejects all final causes from philosophy; the most perfect kind of science being, in his judgment, that of effects from their causes. From the veracity of the Deity, he infers the reality of material objects, which are represented by our senses as existing without us. The idea of extended matter is presented to the mind; if, therefore, matter did not really exist, God, who presents this idea before the mind, would be a deceiver.

The physical principle of Cartesianism is this, that *nothing exists but substances*; and these are of two kinds, viz. one which thinks, or mind, and another which is extended, or body. The essence of the former is thought, and that of the latter extension; so that the thinking substance cannot be without some actual thought; nor can any part be retrenched from the extension of a thing, without taking away so much of its substance. Other attributes ascribed to each of these substances are modes or qualities. The first article is opposed by Mr. Locke, who endeavours to shew, that thinking is not essential to the soul, or that its essence does not consist in thought; but that there are various occasions wherein it does not think at all. See DREAM. The latter is strongly opposed by the Jesuits, &c. as inconsistent with the doctrine of TRANSUBSTANTIATION; but is much better confuted by the modern writers, from the principles of the Newtonian philosophy.

The sole essential property of body being extension, and quantity differing from extended substance, only in our conceptions, space, and the corporeal substance contained in it, are in reality the same; for extension in length, breadth, and depth, which constitutes space, also constitutes body. Since extension is universal, Des Cartes naturally concludes there is no vacuum, nor any possibility thereof in nature; but that the world is absolutely full: for mere space is precluded by this principle; because extension being implied in the idea of space, matter is so too. If there were any such thing as a vacuum, says he, it might be measured: the vacuum, therefore, is extended, and of consequence is matter; every thing extended being matter. See VACUUM.

He adds, however, after denying a vacuum, or extension without matter, or properties of matter, that its parts are separable and moveable; though these seem to imply more than mere extension. He defines motion to be the translation of a body from the neighbourhood of bodies that are in contact with it, and considered as quiescent, to the neighbourhood of other bodies; and thus destroys the distinction between absolute or real, and relative or apparent motion; though both equally agree to this definition. He maintains that the same quantity of motion is always preserved in the universe; because God, he says, must be supposed to act in the most constant and immutable manner. And hence he likewise deduces his three laws of motion: according to which God, the first universal cause of all motion, in the beginning communicated motion to matter; viz. that a body must continue in its state, as to rest, motion, figure, &c. till some external influence produce a change, which is his first law of nature;—that the direction of motion is naturally rectilinear, or that a body never changes its direction of itself; which is his second law:—and that a body in motion, when it meets with another moving with a greater force, is reflected without losing any part of its first motion; but when it meets with a body moving with less force, it then carries this body along, and loses as much motion as is transferred to it; and this is his third law of nature. He accounts for the hardness of bodies from their parts being quiescent with respect to each other; and for fluidity from their being perpetually moved in all directions. These principles, says Des Cartes, are sufficient for explaining all the phenomena of nature; and no others ought to be admitted or even wished for: and yet there is not hardly any one of them, that is not liable to insuperable difficulties. Des Cartes concluded, from the immutability of the deity, that the same quantity of motion is always preserved in the universe; whereas this quantity is continually varying: it is diminished in the composition of motion, and in many cases, in the collision of bodies that have an imperfect elasticity; and it is increased in the resolution of motion, and in some cases, in the collisions of elastic bodies. Moreover, it requires an active principle to account for the hardness of bodies, nor is it sufficient for this purpose that the particles be at rest; for this would not hinder their being separated from each other by the least force.

These principles of physics once supposed, Des Cartes explains mechanically, and according to the laws of motion, how the universe might have assumed its present form, and may be for ever preserved; and whence the present appearances of nature do arise. He supposes, that God created matter of an indefinite extension; that he divided this matter into little cubic portions, or masses full of angles; so as to replenish space without leaving any interstices between them; and that these particles, deriving from the motion impressed upon them an incessant agitation, which broke off their angular parts, became round, and formed what this ingenious

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genious and fanciful philosopher calls the matter of the second element. The angular parts themselves, being ground into the most subtile particles of all, became the matter of his first element, and served to fill all the pores of the other. But there being more of this first element than was necessary for that purpose, it became accumulated in the centres of the vortices, of which he imagined the universe to consist, and formed there the bodies of the sun and stars. For, according to this philosopher, the solar systems were infinite in number, each fixed star being the centre of one; and he, indeed, is among the first of the moderns, who thus removed the boundaries of the universe; even Copernicus and Kepler themselves, having confined it within, what they supposed, the vault of the firmament. The centre of each vortex being thus occupied by the most active and moveable parts of matter, there must necessarily among them be a more violent agitation than in any other part of the vortex, and this violent agitation of the centre cherished and supported the movement of the whole. The heavens were filled with the matter of the second element, the medium of light. But the planets and comets consisted of a third element grosser than the other two, the generation of which our philosopher traces through all its steps. According to him, the matter of the first element must have constantly flowed out through the interstices between the spherical particles of the second element, where the circular motion is greatest, and must have returned continually at the poles of this motion towards the centre of the vortex; where, being apt to cohere together, they at length produced the grosser particles of the third element; and when these came to adhere in a considerable quantity, they gave rise to the spots on the surfaces of the sun or stars. Some being crufted over with such spots became planets or comets; and the force of their rotation becoming languid, their vortices were absorbed by some more powerful neighbouring vortex. In this manner the solar system was formed, the vortices of the secondary planets having been absorbed by the vortex of the primary, and all of them by that of the sun. Des Cartes also maintains, that the parts of the solar vortex increase in density, but decrease in celerity, to a certain distance; beyond which he supposes all the particles to be equal in magnitude, but to increase in celerity as they are farther from the sun. In those upper regions of the vortex he places the comets; in the lower parts he ranges the planets; supposing those that are more rare to be nearer the sun, that they may correspond to the density of the vortex, where they are carried round. He accounts for the gravity of terrestrial bodies from the centrifugal force of the ether revolving round the earth; which, he imagined, must impel bodies downwards that have not so great a centrifugal force, much in the same manner as a fluid impels a body upwards that is immersed in it, and has a less specific gravity than the fluid. From the same principles he professes to explain the phenomena of the magnet, and to account for every phenomenon in nature.

The system of Des Cartes, notwithstanding its defects and errors, and though in some respects it has more the appearance of a romance than of a just philosophy, was distinguished in an eminent degree by its subtlety, ingenuity, and originality; so that it not only engaged the attention of the learned, but long continued, in the midst of all the opposition with which it had to encounter from the professed enemies of innovation, to be zealously defended by many able writers, and to be publicly taught in the schools throughout all Europe. If we trace Cartesianism to its origin, we shall find that some parts of it appear to have been derived from the Grecian philosophy: particularly the notion of innate ideas,

and of the action of the soul upon the body, from Plato; the doctrine of a plenum from Aristotle; and the elements of the doctrine of vortices from the atomic school of Democritus and Epicurus; but Des Cartes contrived, by the vigorous powers of his genius and the fertility of his imagination, to form of these and similar materials a new system of philosophy, which professed to resolve all difficulties, and to comprehend a satisfactory explanation of all the phenomena of nature. His labours, however, would have been more valuable, if he had not suffered himself to be led astray into the romantic regions of hypothesis by the false notion, that the nature of things may be better understood by endeavouring to account for appearances from hypothetical principles, than by inferring general principles from an attentive observation of appearances. Accordingly, his fondness for hypothesis led him to confound the ideas of attribute and substance, as in his definitions of matter and space; and those of possibility and probability, as in his doctrine of vortices. Even his celebrated argument for the existence of God, which, indeed, had long before his time been advanced by St. Anselm, archbishop of Canterbury, in his book "Contra Insipientem," and by St. Thomas Aquinas, and other scholastic writers, confounds the idea of an infinite being with the actual existence of that being, and substitutes a mere conception of the meaning of a term in the place of the idea of a being really and substantially existing. Not to add, what is much to be regretted, that, though his whole system is built upon the knowledge of God, and supposes his agency, in establishing the doctrine of a deity, he serfseek the clear and satisfactory ground of final causes, and had recourse to a subtle argument, which few can comprehend, and with which fewer still will be fully satisfied.

In the revolution which the system of Des Cartes produced among metaphysicians and philosophers, the superiority of his genius was aided by the peculiar circumstances of the times; and it required the efforts of such a genius to demolish the structure of Aristotelian philosophy. Aristotle had been, for more than a thousand years, regarded as an oracle; and his authority was the test of truth. The Peripatetic doctrines were so incorporated with the whole system of scholastic theology, that to dissent from Aristotle was to alarm the church. However, the prevailing system was beginning to lose its authority; Des Cartes perceived its defects; and he seized the favourable moment to introduce and establish a new system. Having applied much to the mathematical sciences, and having made considerable improvement in them, (see the preceding article), he wished to introduce that perspicuity and evidence into other branches of philosophy which he found in them. To him we must allow the honour of having been the first who drew a distinct line between the material and intellectual world; which, in all the old systems, were so blended together, that it was impossible to say where the one ends and the other begins. In that part of philosophy which relates to the mind, Des Cartes laid the foundation, and put us into that track, which all wise men now acknowledge to be the only one in which we can expect success. With regard also to physics, or the philosophy of body, if he had not the merit of leading men into the right track, we must allow him that of bringing them out of a wrong one. By the diffusion of the Cartesian system, *materia prima*, substantial forms, and occult qualities, with all the jargon of the Aristotelian physics, fell into utter disgrace, and were never mentioned by the followers of the new system, but as a subject of ridicule. Aristotle, after a reign of more than 1000 years, was now exposed as an object of derision even to the vulgar, arrayed in the mock majesty of his substantial forms and occult qualities. Queens

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and princesses, the most distinguished personages of the age, courted the conversation of Des Cartes, and became adepts in his philosophy. In this number we may reckon Christina, queen of Sweden, and Elizabeth, daughter of Frederic, king of Bohemia, the mother of our royal family. The last, though very young when Des Cartes wrote his "*Principia*," he declares to be the only person whom he knew, who perfectly understood not only all his philosophical writings, but the most abstruse of his mathematical works. The triumph of the Cartesian system over that of Aristotle is one of the most remarkable revolutions in the history of philosophy. When his authority ceased, that reverence for hard words and dark notions, by which men's understandings had been strangled in early years, was turned into contempt, and every thing suspected which was not clearly and distinctly understood. This is the spirit of the Cartesian philosophy; and it is a more important acquisition to mankind than any of its particular tenets; and although after the sober method of philosophising, introduced by lord Bacon, began to be generally adopted, and the fabrications of romantic theories gave way to the experimental study of nature, the system of Des Cartes, like "the baseless fabric of an air-vision," has disappeared, and has scarcely "left a wreck behind," yet for exciting this spirit so zealously, and spreading it so successfully, Des Cartes deserves immortal honour. Besides, by introducing geometry into physics, and accounting for natural phenomena from the laws of mechanics, he did infinite service to philosophy; and contributed both by his practice and example, to free it from that venerable rust, which in a long succession of ages it had contracted: and thus to him, in some measure, is owing the present system of the mechanical, and even of the Newtonian philosophy.

After the above detail, we shall not wonder that the Peripatetics, or Aristotelians, seconded by the influence of the clergy, who apprehended that the cause of religion was aimed at and endangered by the philosophical innovations of Des Cartes, should excite a clamour, and exert their utmost efforts to prevent the overthrow of their old system, and to diminish the growing reputation of the new philosophy. In order the more readily and effectually to execute this invidious purpose, they not only accused Des Cartes of the most dangerous and pernicious errors, but proceeded, in the extravagance of their malignity, to allege against him a charge of atheism, which those who are acquainted with his avowed principles, and with the basis of his system, must perceive to have been altogether unfounded. The Theosophists, Rosicrucians, and Chemists also entered into the contest against Des Cartes, though they conducted themselves with greater moderation than the Aristotelians. The consequences of this dispute were, however, favourable to the progress of science; for many European philosophers, who were adverse to the discriminating sentiments of Des Cartes, were nevertheless encouraged by his example to pursue their inquiries with greater freedom from the restraints of tradition and personal authority, than they had formerly done, and to emancipate themselves from that yoke of servitude under which Aristotle and his followers had so long kept them in subjection. Among the most eminent cotemporaries of Des Cartes, who applauded, in general, the efforts he made towards the reformation of philosophy, and the noble resolution with which he broke the shackles of magisterial authority, and who also acknowledged that he had made valuable discoveries in philosophy, there were some who discovered several essential defects in his philosophy, and who considered it in various respects as hypothetical, founded on fancy rather than experience. They actually attacked the fundamental principles upon which his whole system of philosophy was

built, such as his ideas of the Deity, of the universe, of matter and spirit, of the laws of motion, and other points that were connected with these. Some of these principles they pronounced to be uncertain; others of a pernicious tendency, and adapted to produce the most dangerous errors; and others again they considered as directly contrary to the language of experience. At the head of these objectors was his own fellow-citizen Gassendi, who had made war before him upon the Aristotelians and Chemists; who, in genius, was his equal; in learning, far his superior; and whose mathematical knowledge was most uncommon and extensive. Gassendi first attacked those mathematical principles, which supported the whole structure of the Cartesian philosophy; he then proceeded to substitute, in the place of the Cartesian system, one that resembled the natural philosophy of Epicurus, though much more rational, consistent, and perfect. See GASSENDI. The controversy between these philosophers, Gassendi and Des Cartes, produced two leading philosophical sects, denominated the *Mathematical* and *Metaphysical*, which see.

Cartesianism was nearly prohibited by an arret of the parliament of Paris; and had been so in effect, if it had not been prevented by a burlesque address presented to the first president. After the Cartesian philosophy had been favourably received, it was vehemently attacked, in the year 1639, by Voet, professor of theology at Utrecht, who regarded it as a system of impiety; and this assertion he grounded upon the following principles by which it was introduced: viz. "that the person who aspires after the character of a true philosopher must begin by doubting of all things, even of the existence of a Supreme Being—that the nature or essence of spirit, and even of God himself, consists in *thought*—that space has no real existence, is no more than the creature of fancy—and that, consequently, *matter* is without bounds." Des Cartes defended his principles; but Voet was seconded by the most eminent Belgic divines, and applauded by the greatest part of the Dutch clergy. In 1656, when the principles and tenets of Des Cartes were applied to the illustration of theological truth, an alarm was raised in the Dutch churches and schools of learning, and it was resolved in several of their ecclesiastical assemblies not to permit that *impious* philosophy, as Cartesianism was called, to make such encroachments upon the domain of theology. The states of Holland approved this resolution, and issued a public edict, forbidding both the professors of philosophy and theology either to explain the writings of Des Cartes to the youth under their care, or to illustrate the doctrines of the gospel by the principles of philosophy. It was further resolved by an assembly of the clergy, held at Delft in the following year, that no candidate for holy orders should be received into the ministry before he made a solemn declaration, that he would neither promote the Cartesian philosophy, nor disfigure the divine simplicity of religion, by loading it with foreign ornaments. Laws of a like tenor were afterwards passed in the United Provinces, and in other countries. But all these measures were ineffectual to stop the progress of Cartesianism, which, at length, obtained a solid and permanent footing in the seminaries of learning, and was applied, both in the academies and pulpits, and sometimes indeed very preposterously, to explain the truths and precepts of Christianity. See on the subject of this article, Maclaurin's Account of sir Isaac Newton's Philosophical Discoveries, b. i. c. 4. Brucker's Hist. of Phil. by Enfield, vol. ii. c. ii. § 6. Cudworth's Inst. Syst. ch. v. § 1. Reid's Essays on the Intellectual Powers of Man, ch. viii. Smith's Ess. on Philos. Subjects, p. 76. Mosheim's E. H. vol. v.

CARTHAGE, in *Ancient Geography*, one of the most powerful

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powerful cities of antiquity, was for many ages the capital of Africa Propria, called also the territory of Carthage. See AFRICA. It was at first called *Cadméia*, i. e. the eastern, from the name of Cadmus, which was common to the chiefs of the Phœnician colonies. It was also denominated *Caccabe*, which in the Phœnician language signified a horse's head, found, as tradition reports, by the Tyrians, when they were digging for the foundations of the fortrefs called *Byrsa*, and considered as an omen portending the martial disposition of the inhabitants, and the future greatness of the city. To this circumstance Virgil refers, *Æn.* l. i. v. 447.

“ ————Pœni

Effodere loco signum, quod regia Juno
Monstrarat, caput acris equi; sic nam fore bello
Egregium, et facilem victu per sæcula gentem.”

“ The Tyrians landing near this holy ground,
And digging here, a prosperous omen found;
From under earth a courser's head they drew,
Their growth and future fortune to foreshew:
This fated sign their foundress Juno gave,
Of a soil fruitful, and a people brave.” Dryden.

On account of this event the Carthaginians had frequently, upon the reverses of their coins, either a horse's head, or the body of a horse dimidiated, or a horse entire, with Victory mounted upon him. Others say, that when Dido arrived in this country, a city actually existed called *Utica*, or the ancient; and that she called her city *Cartha-kadath*, or *Carthadt*, קרתא חדתא, that is, the new city; and from this appellation the Greeks, interchanging χ and θ , deduced *Καρχηδών*, *Carchedon*, and the Romans *Carthago*. Among the more ancient Romans, however, the name of this city, derived from the Carthaginians themselves, was *Cataco*, as appears from the Columna Rostrata of Duilius.

Authors are much disagreed with regard to the æra of the foundation of Carthage. It was built, according to Velleius, 65 years, but according to Trogus and Justin, 72 years, before Rome. Livy seems to place its foundation 20 years higher than these; and Solinus exceeds him 27 years. From Menander the Ephesian, cited by Josephus, and the Tyrian Annals, it appears to have preceded the Roman æra 140 years. According to Livy and Appian, Carthage stood somewhat above 700 years, and Solinus, adding the odd number of years, reckons the period of its existence 737 years; and as it was destroyed under the consulate of Lentulus and Mummius, in the year of the Julian period 4568, the 608th of the Roman æra, and the 146th year before Christ, if we reckon backwards 737 years, we shall ascend to the 883d year B. C. the second year of Athaliah, queen of Judah; and the encœnia, or dedication of the city, says sir Isaac Newton (*Chron. apud Works by Horsley, vol. v. p. 50.*), will fall upon the 16th year of Pygmalion, the brother of Dido, and king of Tyre. She fled in the 7th year of Pygmalion, i. e. in the year 874 B. C. the 4th year of Joash king of Judah; but the æra of the city began with its encœnia. Josephus (*Cont. Ap. l. i. c. 18.*) reckons 143 years from the building of Solomon's temple to the building of Carthage, which last epoch he seems not to distinguish from the flight of Dido in the 7th of Pygmalion. The temple was dedicated in the year 1004 B. C. and thus the 7th of Pygmalion will be the 861st year B. C. and the 16th of Pygmalion will be the 852d year B. C. Solomon survived the building of the temple 30 years; and therefore the interval from Solomon's death to the flight of Dido will be 113 years, from which subtracting 7 years, there will remain 106 years for the interval between Solomon's death and the beginning of Pygmalion's reign; and allowing that Solomon died in the 975th year B. C. the 7th of Pygmalion will be the 862d year, B. C. and the

16th of Pygmalion will be the 853d year, B. C. Petavius (*Rat. Temp. l. ii. c. 13.*), after considering the contradictory opinions of the ancients with great attention, fixes the Carthaginian æra with an apparent exactness; for, according to him, Dido began to build Carthage 137 years before the foundation of Rome, if, with Varro, we place this in the 4th year of the 6th Olympiad (753 years, B. C.) or 142 years, if, with archbishop Usher, we prefer the account of Fabius Pictor, the most ancient of the Roman historians, and a writer of great authority, who maintains it to be near the beginning of the eighth, or 748 years, B. C. Blair, in his *Tables*, has assigned the æra of the building of Carthage to the 869th year, B. C. In order to reconcile the discordant accounts that have been given of this æra, it has been suggested, that Carthage consisted of different parts, which are supposed to have been built at different times. Cothou, or the port, together with the buildings belonging to it, was first built; Megala, which, in respect of Cothou, was called the new town, or Carthada, was built about 194 years later, and Byrsa, about 166 years after Megara.

Whatever difference of opinion may have subsisted among chronologers about the æra of Carthage, it is generally agreed that the Phœnicians were its founders. Eusebius (*in Chron.*) and Procopius (*de bell. Vand.*) affirm positively, that the Canaanites who fled from Joshua retired hither; and St. Austin (*in Expos. ad Epist. ad Roman.*) is of opinion, that the Carthaginians were descended from these Canaanites. Philistus of Syracuse, who lived 350 years before Christ, relates (*apud Euseb. in Chron.*) that the first traces of Carthage were owing to Zorus and Charcheden, two Tyrians or Phœnicians, 30 years before the destruction of Troy in the year 1184, B. C. according to Eusebius. Appian (*in Libyc.*) attributes this event to the same two Phœnicians, 50 years before that period; and from him Scaliger corrects the numbers of Eusebius. Accordingly, Dido was induced to chuse this place for her Tyrians in preference to any other, because it had been inhabited for some time by the Phœnicians, who were her countrymen, and from whom she had, therefore, reason to expect a friendly reception. To this Tyrian princess the concurrent voice of antiquity ascribes the first settlement of Carthage. See *Just. l. xviii. c. 4. 5. 6.* App. *de bell. Punic. p. 1.* Strabo, l. xvii. p. 832. *Paterc. l. i. c. 6.* This princess, called Elisa, but better known by the name of Dido, was the grand daughter of the famous Jezebel, called in scripture Ethbaal, and the great grand-daughter of Ithobal, king of Tyre. She married her near relation Acerbas, otherwise called Sicharbas and Sichæus, a very rich prince, and her brother was Pygmalion, king of Tyre. When this prince murdered Sichæus, in order to seize his immense treasures, Dido, in order to elude the avarice of her brother, withdrew secretly with her deceased husband's possessions; and after having long wandered in quest of a commodious settlement, she, and her Tyrian attendants, landed on the coast of the Mediterranean, in the gulf where Utica stood; fixed her residence at Carthage; and either founded, or most probably, much enlarged this noble city. The wealth of her husband, and the skill of the Tyrians, who accompanied her, and who were at this time the most polished and ingenious people in the world, enabled her to enlarge and beautify the place, if she did not lay the foundation of it; to wall it round, and build a strong citadel in it; to lay the basis of a most flourishing and extensive commerce for which the Tyrian nation was so renowned; and to introduce a form of government, which Aristotle seemed to think one of the most perfect that ever was known in the world. Some writers have affirmed, that Dido outwitted the natives, by desiring to purchase of them, for her intended

tended settlement, only so much land as an ox's hide would compass. This modest request was instantly complied with; upon which she cut the hide into the smallest thongs, and with them compassed a large tract of ground, on which she built a citadel, called Byrsa, from the hide. But this tale is generally exploded by the learned. This princess, it is said, was afterwards courted by Jarbas, king of Getulia, and threatened with a war in case of refusal. Dido having bound herself by an oath not to contract a second marriage, and being incapable of violating her engagement to Sichæus, desired time for deliberation, and for appeasing the manes of her first husband by sacrifice. Having therefore ordered a pile to be raised, she ascended it; and drawing out a dagger which she had concealed under her robe, stabbed herself with it. This story is related with some different particulars by Justin, l. xviii. c. 6.

Virgil has much altered this history, by supposing that Æneas, his hero, was cotemporary with Dido, though there was an interval of nearly three centuries between the one and the other; the æra of the building of Carthage being fixed 300 years lower than the destruction of Troy. However, in the plan of his story he has displayed great judgment; for as he wrote for the Romans he has contrived to interest them the more, by introducing the implacable hatred which subsisted between Carthage and Rome, and ingeniously deducing the origin of it from the very remote foundation of these two rival cities.

Carthage was situated at the bottom of a gulf, upon a peninsula 360 stadia, or 45 miles in circumference; the isthmus joining this peninsula to the continent of Africa being 25 stadia, or three miles and a furlong in breadth. Dr. Shaw, (*Travels*, p. 82.) concludes from an estimate made on the spot, that the peninsula is about 30 miles round, and that the city may have taken up nearly half that space. On the west side, a long tract of land, half a stadium broad, projected from it, which running into the sea separated it from a lake, or morass, and was strongly fortified on all sides by rocks, and a single wall. In the middle of the city stood the fortress, or citadel, erected by Dido, called *Byrsa*, which is a Greek corruption of the Punic, or Phœnician name *Buzra*, *Bosya*, or *Botfra*, denoting a fortress, or citadel; and this etymology excludes the fable of the ox's hide. *Byrsa*, according to Servius, (in Virgil), was 22 stadia, or near three English miles in circumference; though Eutropius maintains that it did not much exceed 2000 paces, or not quite two miles. It contained a rich, beautiful, and spacious temple sacred to Æsculapius, seated on a very high hill, which was ascended by 60 steps. Afrubal's wife set fire to it, and entirely consumed it, together with herself, her children, and 900 Roman deserters, who had fortified themselves in this place in order to avoid falling into the hands of Scipio. On the south side, towards the continent, where *Byrsa* stood, the city was surrounded by a triple wall 30 cubits high, exclusive of the parapets and towers, with which it was flanked at equal distances, each interval being 480 feet. Each tower had its foundation sunk 30 feet deep, and was four stories high, though the wall was but two: they were arched, and in the lower part, corresponding in depth with the foundation above-mentioned, were stables, large enough to hold 300 elephants, with their fodder; over these were stables for 4000 horses, and lofts for their food. There was likewise room enough to lodge 20,000 foot and 4000 horse. Here were two harbours, disposed in such a manner as to communicate with each other, and having a common entrance, 70 feet broad, secured with chains. The first was appropriated to the merchants, and included a great number of places of refreshment and all kinds of accommodation for the seamen.

The second, or inner port, was, as well as the island, called *Cothon*, in the midst of it, lined with large keys, in which were distinct receptacles for securing and sheltering from the weather 220 vessels, and it was designed chiefly for ships of war. Strabo calls the small island *Cothon*; but Appian applies the term likewise to the port, or harbour itself. So active were the Carthaginians, that before Scipio had blocked up the old port of *Cothon*, they in a short time built a new haven, the traces of which are still to be seen. See *Cothon*. Near the *Cothon* was a temple of Apollo, in which was a statue of that deity of massive gold; and the inside of the temple was covered with plates of the same metal, weighing 1000 talents. Over the receptacles just mentioned were magazines, or store-houses, containing all necessaries for the arming and equipping of fleets. The entrance into each of these receptacles was adorned with two marble pillars of the Ionic order; so that both the harbour and the island represented on each side two magnificent galleries. The admiral's palace was so situated on the island, just opposite to the mouth of the harbour, that he could discover whatever was doing at sea, although no one there could perceive what was transacting in the inner part of the harbour; nor had the merchants, when they entered the port, any prospect of the men of war, being separated from them by a double wall, and each port having its separate gate that led into the city, without passing through the other. The *Byrsa* was considered as the interior part of Carthage, and was surrounded by the *Megara*, or *Megaraia*, that is, the houses or towns, for so the word signifies in the Phœnician tongue, or its exterior part; and thus taken together, they formed a kind of double town.

As to the extent of the city, Livy informs us, that it was 23 miles in circumference; and Pliny (l. v. c. 4.) intimates, that Carthage, when possessed by the Phœnicians, was much larger than when it became a Roman colony; and Suidas affirms, that it was the greatest and most powerful city in the world. The number of inhabitants contained in this city amounted, at the beginning of the third Punic war, to 700,000. The forces which they were able to bring into the field, and the power which they were capable of exercising at sea, were very formidable. Hamilcar, in his expedition against Gelon, the tyrant of Syracuse, commanded an army consisting of 300,000 men, and the fleet, co-operating with the land forces, was composed of more than 2000 ships of war, and above 3000 transports. Their riches were likewise immense; for at the final destruction of the town, even after it had been plundered, and supposed to be entirely exhausted and consumed, Scipio carried away nearly a million and a half sterling. The dominion of Carthage was not long confined to Africa. Strabo observes (*Geog.* lib. xvii.) that the Carthaginians possessed 300 cities in Africa, before the beginning of the third Punic war; nor is this incredible, if we consider, that the dominions of this state in Africa, before that war extended from the western confines of Cyrenaica to the pillars of Hercules, or the straits of Gibraltar, a tract of land near 1500 miles in length. The inhabitants of its ambitious city extended their conquests into Europe, by invading Sardinia, seizing a great part of Sicily, and the islands W. of it, and reducing almost all Spain, even as far as the Pyrenées, and having sent powerful colonies every where, they enjoyed the empire of the sea for more than 600 years; and formed a state which was able to dispute pre-eminence with the greatest empires of the world by their wealth, their commerce, their numerous armies, their formidable fleets, and, above all, by the courage and talents of their officers.

Carthage, as Dr. Shaw informs us, (*Travels*, p. 81.) was built upon three hills, somewhat inferior in elevation to those

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those upon which Rome was erected. This famous city, after undergoing a variety of revolutions, was at length destroyed by Scipio Æmilianus, under the consulate of Lentulus and Mummius, in the 146th year B. C. The Romans, after having completely destroyed it, ordered that it should never be inhabited, denouncing dreadful imprecations against those, who, contrary to their prohibition, should attempt to rebuild any part of it, especially Byrsa and Megara. About 24 or 30 years after this event, C. Gracchus, tribune of the people, in order to ingratiate himself with them, undertook to rebuild it, and with that view conducted thither a colony of 6000 Roman citizens; and this was the first Roman colony that was ever sent out of Italy. Plutarch intimates, that Gracchus executed his design, which was done in a very imperfect manner; but it is more probable that the work was entirely discontinued, however vigorously begun, in compliance with the orders of the senate. Julius Cæsar, as Appian informs us, conceived a design, in consequence of a nightly dream or vision, of rebuilding Carthage. But his untimely death prevented the completion of his purpose. However, Appian says, that his adopted son, Augustus Cæsar, built a city at a small distance from the spot on which ancient Carthage stood, and called it by the same name; thus avoiding the ill effects of those imprecations, which had been pronounced at the time of its destruction. Thither, it is said, he sent a colony of 3000 men, who were soon joined by considerable numbers from the neighbouring towns. Strabo, on the other hand, intimates, that both Carthage and Corinth were rebuilt at the same time by Julius Cæsar; and he affirms, that Carthage in his time, that is in the reign of Tiberius, was equal, if not superior, to the largest city in Africa. Plutarch confirms the testimony of Strabo. Pliny also mentions it as a considerable colony in his days. Carthage was esteemed the second city in the Roman dominions, and considered as the capital of Africa for several centuries after the commencement of the Christian æra. Its bishops, who were subordinate to the bishop of Rome, and not to the patriarchs of Alexandria, occupied a distinguished rank in the western church. Maxentius laid it in ashes about the sixth or seventh year of Constantine's reign, A. D. 311 or 312; and Genseric, king of the Vandals, took it A. D. 439. At this time Carthage contained the manufactures, the arms, and the treasures of the six provinces. Schools and gymnasia were instituted for the education of the African youth; and the liberal arts and manners, grammar, rhetoric, and philosophy, were publicly taught in the Greek and Latin languages. The buildings of the city were uniform and magnificent; a shady grove was planted in the midst of it; the new port, a secure and capacious harbour, subserved the commercial industry of citizens and strangers; and the splendid games of the circus and theatre were exhibited almost in the presence of the Barbarians. The reputation of the Carthaginians was not equal to that of their country, and the reproach of Punic faith still adhered to their subtle and faithless character. The habits of trade, and the abuse of luxury, had corrupted their manners; but their impious contempt of monks, and the shameless practice of unnatural lusts, are the two abominations which are particularly reprobated by Salvian, the preacher of that age. The king of the Vandals, however, severely reformed the vices of a voluptuous people; and the ancient, noble, ingenuous freedom of Carthage was reduced by Genseric into a state of ignominious servitude. After he had permitted his licentious troops to satiate their rage and avarice, he instituted a more regular system of rapine and oppression. An edict was promulgated, which enjoined all persons,

without fraud or delay, to deliver their gold, silver, jewels, and valuable furniture or apparel, to the royal officers; and the attempt to secrete any part of their patrimony was inexorably punished with death and torture, as an act of treason against the state. The lands of the proconsular province, which formed the immediate district of Carthage, were accurately measured, and divided among the Barbarians; and the conqueror reserved, for his peculiar domain, the fertile territory of Byzacium, and the adjacent parts of Numidia and Getulia. Belisarius retook it in 533 and annexed it again to the Roman empire. In this revolution the trade of Carthage was not interrupted; the shops continued open and busy; and the soldiers, after sufficient guards had been posted, modestly departed to the houses, which were allotted for their reception. Belisarius fixed his residence in the palace; seated himself on the throne of Genseric; accepted and distributed the Barbaric spoil; granted their lives to the suppliant Vandals; and laboured to repair the damage which had been sustained by the suburbs in the preceding night. At supper he entertained his principal officers with the form and magnificence of a royal banquet. He restored with incredible dispatch the walls and ditches of the city, and re-established the strength of an impregnable fortress. At last the Saracens, under Mohammed's successors, towards the close of the seventh century, A. D. 698, so completely destroyed this city, that few traces of it are left. All the remains, says Dr. Shaw, of this once famous city are the area of a spacious room upon one of the hills on which it stood, commanding the south-east shore, with several smaller ones at a little distance from it; the common sewers, which time hath not in the least injured or impaired; and the cisterns, which have shared only in a small degree the general ruins of the city. The harbour, indeed, is now stopped up, and by the north-east winds, with the river Mejerda, the ancient Bagrada, moved almost as far distant from the sea as Utica; though it is still called "El Merfa," or the Port, lying to the north and north-west of the city, and forms, with the lake of Tunis, the peninsula on which Carthage stood. Livy tells us, that Carthage was only 12 miles from Tunis, and this is the distance that still subsists between that city and a fragment of the western wall of Carthage. Polybius indeed makes the distance between Tunis and Carthage 15 miles. The spot on which it stood is, according to the latest observations, about N. lat. 36° 52'. E. long. 10° 40'. See CARTHAGINIANS.

CARTHAGENA, in *Geography*, *New Carthage*, a sea-port town of Spain, in the province of Murcia; seated on the declivity of a hill, and separated from the harbour by an intermediate plain. The city is protected from the south and from the west by high mountains and barren rocks; but to the north and east it is open, and communicates with an extensive valley, which is divided from the plain of Penilla by a ridge of hills, whilst to the north, another chain of mountains separates it from the vale of Murcia. On the summit of the hill, commanding the city, is a castle now decaying; but, on the adjacent heights, are raised considerable works, to defend the harbour, with the arsenal and dock-yard. The harbour is the best in Spain, well sheltered from winds, and well defended. The arsenal is large, and so amply furnished with naval stores, that a ship of the line, as it is said, may be got ready for sea in three days. The number of inhabitants is reckoned to be 60,000, who are distributed in 15,000 families. The streets are wide, and the houses are commodious. They have generally flat roofs, which afford, in this climate, an agree-

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able and cool retreat, where, after sun-set, the inhabitants assemble to enjoy the refreshing breeze; the new parade, extending east and west at the head of the harbour, and looking through its entrance into the Mediterranean, is built on a regular plan; and as a high schistous rock has been cut away to make room for this long range of habitations, excellent vaults are excavated behind each house, for the service of the merchants. At the end of this stands the royal hospital, destined to receive the sick from the dock-yard and the army, with the "presidiarios," or criminals condemned to the galleys, and in Spain reduced to the lowest state of servitude. The cathedral, which is a wretched pile, is now degraded, and the bishop's see being removed to Murcia, it is become a parish church. Of nine convents, eight are occupied by the men. In the midst of the dock-yard is a spacious basin, and in this the ships of war are moored, each in front of the magazine destined to receive her rigging and her stores. The docks are kept dry by fire-engines, of which three are almost constantly at work. They have here 2000 criminals, chiefly smugglers, who, being condemned to work in chains, are called "presidiarios." They are employed in the most servile labour, for 5 or for 7 years; and at the expiration of their terms, they are turned loose upon the public, fitted only to pursue their original occupations. These 2000 slaves require a constant guard of 500 soldiers; and independently of this expence, they cost each to government, five reals a day for their maintenance, whilst their work cannot be estimated at one-tenth of what they eat. In this dock-yard the masts and timber are floated in water, without any apprehension of injury from the worm; because, as they never open their sluices till the water is become putrid, the rapid evaporation leaves a strong brine, in which it is impossible for the worm to live.

The fishery of this sea-port is considerable; and is divided into two branches, independent of each other; that within the port being the property of a fishing company, consisting of 18 associates, established here by charter, whilst, in the open sea, all enrolled mariners are at liberty to fish. Within the port they take chiefly the tunny and the melvas; but the former is the most profitable. Half the quantity of fish that is taken in the harbour, must be sold for the benefit of the poor at a stipulated price; and the king takes one-half of all their profits, amounting to about 1000*l.* a year, as a compensation for his claim of one-quarter of their fish. In the open sea the fishermen are free from oppression and have peculiar privileges.

At Carthagená they manufacture a large quantity of the "esparto" ropes and cables, some of which are spun like hemp, and others platted. These cables are excellent, as they float on the surface of the water, and are not therefore liable to be cut by the rocks on a foul coast. The esparto rush makes good mats for houses, "alpargates" for peasants, and has lately been spun into fine thread for the purpose of making cloth. This rush, it is said, is the peculiar and natural production of all the high and uncultivated mountains in the south, and affords in the dry and elevated regions, where neither hemp nor flax will grow, materials proper for clothing, and for the employment of industry. The most important production of this country, and the most valuable article of commerce is barilla, used for making soap, for bleaching, and for glass. The country producing it is about sixty leagues in length, and eight in breadth, on the borders of the Mediterranean. The quantity exported annually from Spain is about 150,000 quintals, paying a duty of 17 reals per quintal. The chief imports are bale goods and bacalao; the latter directly from Newfoundland; and of the former muslins and cottons are prohibited, though

they are secretly introduced in great quantities. The soil of the adjacent country is loamy, composed of calcareous matter, sand, and clay, from the dissolution of the neighbouring mountains, which consist of schistous rock covered with limestone. In some places is found the siliceous grit or sand-stone, with shingle or smooth gravel and sea-shells; and at no great distance from the city is a mountain, from which they obtain the gypsum used for plaster. The whole country abounds with salt-petre. Oxen are used for draught; but in tillage they employ mules and asses. Their course of husbandry is wheat, barley, and fallow. They sow their wheat in November, and in July reap from 10 to 100 for one, according to the wetness of the season. They grind all their corn by wind-mills, 30 of which may be counted near the city; and water for common use is scarce and dear. The trees most common in the adjoining valley are elms, poplars, olives, figs, pomegranates, mulberries, apricots, palms, palmitos, and the ginjolero; the last of which bears a small fruit resembling, in size and form, the olive, with a smaller kernel, and remarkably sweet. The palmitos is the *chamerops humilis*. The most endemical diseases at Carthagená are intermittent and putrid fevers, which arise from the proximity of an extensive swamp, containing many hundred acres. The municipal government of Carthagená is vested in a military governor, with his alcalde mayor; 30 regidores, whose office passes by inheritance, if not previously sold; and two syndics chosen by the people as their peculiar guardians. The governor is the supreme and independent judge for the army, and for strangers settled in the country, while his alcalde presides in the tribunal for the citizens. In consequence of the vicious formation of the government and the mal-administration of the laws, murder and assassinations are frequent in Carthagená, and the most atrocious villains escape punishment. Want of fidelity to matrimonial engagements is equally prevalent at Carthagená, as in the other provinces of Spain. N. lat. 37° 37'. W. long. 1° 8' 30". Townsend's Journey through Spain, vol. iii.

This city was founded in the year of Rome 525, (B. C. 229.) by Asdrubal, the Carthaginian general, in order to secure the subjection of the country. It was taken by Scipio Africanus in the year of Rome 542 (B. C. 212.), after the defeat of Hannibal under the walls of Carthage in Africa. It became a Roman colony in the time of Cæsar, who established a colony in it after the battle of Munda, and was one of those denominated "conventus;" its jurisdiction extending over 65 towns. After having been destroyed by the Goths, it was rebuilt by Philip II. Diamonds, rubies, amethysts, and other precious stones were formerly found in its vicinity, so that it was reckoned the Indies of the Romans; and it was famous for its silver mines. Strabo (l. iii. p. 148.) mentions a mine near this city, which yielded daily 25,000 drachms of silver, or about 300,000*l.* a year.

CARTHAGENA, a province or government of South America, in the country of Terra Firma, the jurisdiction of which reaches eastward to the great river of de la Magdalena, and along this river southward, till, winding away, it borders on the province of Antioquia; from thence it stretches westward to the river of Darien; and from thence northward to the ocean, along the coasts between the mouths of these two rivers. The extent of this government from east to west is generally computed at 53 leagues; and from south to north 85. In this space, besides mountains and forests, are several fruitful vallies, called by the natives Savannahs; as those of Zamba, Zenu, Tolu, Mompox, Baranca, and others; and in them many settlements,

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large and small, of Europeans, Spanish creoles, and Indians. According to an existing tradition this country formerly abounded in gold, but the old mines are now either neglected, or exhausted. But the riches of the country were principally owing to the trade which it carried on with Choco and Darien; from whence were brought, in exchange for this metal, the several manufactures and works of art which were needed. Gold was so plentiful, that it was the common ornament of the Indians, both men and women. The country, more especially about the capital, is so luxuriant, that the trees and plants which it spontaneously produces present to view a rich and perpetual verdure; and the interwoven branches of the trees form a shelter impenetrable both to heat and light. The trees are large and lofty, very various, and altogether different from those of Europe. The principal, with regard to size, are the caobo or acajou, of which they make their canoes and champanes for fishing, the cedar both white and reddish, the maria, and the balsam tree, which two last, besides the utility of their timber, distil the admirable balsams called maria oil and balsam of Tolu, so called from a village, where it is found most excellent and most abundant. Besides these trees, here are also the tamarind, the medlar, the sapote, the papayo, the guayabo, the cassia, the palm, the manganillo, and several others, most of which yield a wholesome and palatable fruit, as well as a durable and variegated wood. In the woods about Carthagena is found a great quantity of bejucos, of different magnitude, figure, and colour; one species of which is particularly noticed on account of its fruit, called "habilla de Carthagena," or the bean of Carthage, which is considered as one of the most effectual antidotes which that country affords against the bites of vipers and serpents. See HIPPOCRATEA. This country also abounds with various animals, both tame and wild. The only tame eatable animals are the cow and the hog, which are very plentiful. Wild geese and other poultry are good and very abundant. There are also different kinds of game, as deer, rabbits, and wild boars, called sajones; but these are eaten only by the country negroes and Indians, except the rabbits, which find a good market in the city. The wild beasts are tigers, leopards, foxes, armadillos, squirrels, and monkeys, the smallest and the most common of which are the micos. The birds are incalculably numerous, and their various plumage is exquisitely beautiful and brilliant. The most singular are the guacamayo, beautiful beyond expression in plumage, but no less disagreeable for its croaking noise, the tulcan, or preacher, and the gallinazos, which latter are of great service in cleaning the city of all filth and ordure, by devouring dead animals, &c. Bats are very common, and they are so numerous at Carthagena, that when they begin to fly, they may be said to cover the streets like clouds. Among the insects and reptiles, the principal are the snakes, the centipeds, the scorpions, and spiders.

The constant moisture and heat of this climate will not allow the cultivation of wheat, barley, and other grains of that kind; but maize and rice are produced in great abundance. Of the maize they make a kind of bread, called bollo, which is generally used; and they also use it in feeding hogs and fattening poultry. The casava bread, made from the roots of yuca, names, and moniatos, is very common among the negroes. Plantations of sugar-canes are so general, as to reduce the price of honey; and part of the juice is converted into spirit. Cotton-trees are also in part spontaneously produced, and others, which are the best, are planted and cultivated. The cacao trees of Carthagena excel those of the Caracas and neighbouring districts both in the size and goodness of the fruit. Besides melons, grapes, oranges, dates, and fruits which

belong to other countries, Carthagena has some more appropriate to itself, such as the pine-apple, the plantain, the banana, the papayas, &c. The chief town of this country is "Carthagena."

CARTHAGENA, a city and sea-port of South America, and metropolis of the province above described. It is seated on a peninsula, or sandy island, which is joined to the continent by two artificial necks of land, the broadest of which is not above 70 yards wide. The fortifications are regular and strong, and constructed after the modern manner. At a small distance from the suburb, called Xexemani, seated on an island, and connected with the city by a wooden bridge, is a hill, on which is constructed a fort called St. Lazaro, that commands both the city and suburb. The height of the hill is between 20 and 21 toises, and it is joined to several higher hills, which run off in an eastern direction. These terminate in another hill of the height of 84 toises, on the top of which is a convent of bare-footed Augustines. The city and suburbs are well laid out; the streets being straight, broad, uniform, and well paved. The houses are mostly built of stone; they consist chiefly of only one story above the ground-floor; and the apartments are well contrived. All the houses have balconies of wood, which is more durable in this climate than iron. Carthagena has several churches and convents; and, including its suburbs, it is equal to a city of the third rank in Europe. It is well peopled: the number of its inhabitants, most of whom are descended from the Indian tribes, being estimated at 25,000. The governor resides in the city, and in civil affairs, an appeal lies to the audience of Sta. Fé; and when in 1739 a vice-roy of Sta. Fé was created under the title of vice-roy of New Granada, the government of Carthagena became also subject to him in military affairs. Carthagena has also a bishop, whose spiritual jurisdiction is of the same extent as the military and civil government. The ecclesiastical chapter is composed of the bishop and prebends. There is also a court of inquisition, whose power extends to the three provinces of Isla Espanola, where it was first settled, Terra Firma, and Santa Fé. Besides these tribunals, the police and administration of the city are conducted by a secular magistracy, consisting of regidores, from whose number are annually chosen two alcaldes. There is also an office of revenue, under an accountant and treasurer, where all taxes and royal revenues are received, and whence the proper issues are directed. A person of the law, under the title of "auditor de la gente de Guerra," determines processes.

The bay, which we shall more particularly describe in the sequel of this article, and the country before called "Calamari," were discovered in 1502 by Roderigo de Bastidas; and in 1504, Juan de la Cosa, and Christopher Guerra began the war against the Indian inhabitants, who, being a martial people, and joined by their women in the fatigues and dangers of war, resisted them with a valour and obstinacy which they did not expect. Their common arms were arrows, which they poisoned with the juice of certain herbs, so that the slightest wounds were fatal. They were succeeded by Alonso da Ojeda, attended by Juan de la Cosa, as his chief pilot, and Americo Vesputio, a celebrated geographer of those times; but they met with similar resistance, and made little impression. Nor was Gregorio Hernandez de Oviedo more fortunate. At length, the conquest of the Indians was accomplished by don Pedro de Heredia, who, after gaining several victories over them, subjected this part of America to the crown of Spain in 1533. The advantageous situation of Carthagena, the extent and security of its bay, and the great share it acquired of the commerce of that southern continent, soon caused it to be erected into a bi-

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shop's fee. The same circumstances contributed to its preservation and increase, as the most esteemed settlement and emporium of the Spaniards; but they also drew upon it the attention and hostilities of foreigners, who have several times, with a view to its wealth and importance, invaded, taken, and plundered it. Its chief importance is derived from its harbour, which is the safest and best fortified of any in the American dominions of Spain. In a situation so favourable, commerce soon began to flourish; and as early as the year 1544, it seems to have been a town of some note. At this period, soon after its establishment, it was invaded by some French adventurers, conducted by a Corsican pilot. In 1585 it was pillaged and almost destroyed by sir Francis Drake; but happily rescued from the flames by a ransom of 120,000 ducats, paid him by the neighbouring colonies. It was again invaded and pillaged by the French in 1597, under the command of M. de Pointis, with an armament, consisting of Flibustiers, or Buccaneers, little better than pirates, but as subjects to the king of France, they were under his protection. After obliging the fort of Bocca Chica to surrender, so that the entrance of the bay was laid open, fort Lazaro was besieged, and this was followed by the surrender of the city. But though the town capitulated, avarice consigned it to pillage. At a later period, viz. in 1741, an expedition against Carthagena was undertaken by the English, and the conduct of it entrusted with admiral Vernon, who commanded the fleet, and general Wentworth, who conducted the land force. When the English, after encountering many difficulties, got possession of the harbour, necessary dispositions were made for gaining the town; but here they failed; and the officers thought it better to retire with their fleet and army than to stay longer in a country, the unwholesome climate of which was infinitely more to be dreaded than the utmost efforts of its timid inhabitants.

When Carthagena was chosen as the port, in which the galleons should first begin to trade on their arrival from Europe, and to which they were directed to return, in order to prepare for their voyage homeward, the commerce of its inhabitants was so much favoured by this arrangement, that it soon became one of the most populous, opulent, and beautiful cities in America. On the arrival of the galleons, Carthagena was the mart to which the inhabitants of the neighbouring provinces resorted; and the merchants of Sta. Fé, Popayan, and Quito, not only disposed of all their stock, but also laid out all the money entrusted by commission for such goods as were most wanted in their respective countries. They brought gold and silver in specie, ingots, and dust; and also emeralds, the demand for which was then considerable, though it has since decreased. Afterwards, during the interval between the departure and the arrival of the galleons, the trade of Carthagena was wholly confined to the towns and villages within its jurisdiction, from whence the inhabitants were supplied with all the necessaries of life in exchange for European commodities. Carthagena, however, we may well imagine, has reached its highest point of exaltation; and it must have been so far affected by the change that has taken place in the Spanish system of trade with America, which has withdrawn from it the desirable visits of the galleons, as to feel at least a temporary decline. But the wealth, now collected there, must find or create employment for itself, or may be turned with advantage into some new channel. Its harbour is so safe, and so conveniently situated for receiving commodities from Europe, its merchants have been so long accustomed to convey those into all the adjacent provinces, that it is probable they will still retain this branch of trade, and Carthagena continue to be a city of great importance.

Carthagena bay, to which the importance and prosperity of this city has been chiefly owing, is one of the best, not only on this coast, but also in all the known parts of this country. It extends $2\frac{1}{2}$ leagues from north to south, has a sufficient depth of water and good anchorage, and is so smooth that the ships are no more agitated than on a river, though the numerous shallows at the entrance render it necessary to secure a good pilot. The entrance into the bay is through the narrow strait of Bocca Chica, or Little mouth, which, since the invasion of the English, has been shut up, and a more commodious one opened and fortified. Towards Bocca Chica, and $2\frac{1}{2}$ leagues distant seaward, there is a shoal of gravel and coarse sand, having in many parts of it not more than a foot and a half of water. This bay abounds with great variety of fish, such as the shad, &c. The turtles are large and well tasted. But it is very much infested with sharks, which are very dangerous to seamen both in the water, and even in their boats.

The inhabitants of Carthagena and its adjacent territory may be distributed into different casts, or tribes, who claim their origin from a coalition of whites, negroes, and Indians. The whites may be divided into two classes, viz. the Europeans and Creoles, or whites born in the country. The former are commonly called "Chapetones," most of whom, when they have acquired a competent fortune, return to Spain, or remove into inland provinces in order to increase it. Those who are settled at Carthagena carry on the whole trade of the place, and live in opulence; whilst the other inhabitants are indigent, and obliged to recur to hard and mean labour for a subsistence. The families of the white Creoles compose the landed interest; and many of them have large estates. Others, however, are in mean circumstances. Among the other tribes, which are derived from an intermarriage of the whites with the negroes, the first are the "Mulattos;" next to these are the "Tercerones," produced from a white and a Mulatto; after these follow the "Quarterones," proceeding from a white and a Terceron; and the last are the "Quinterones," who owe their origin to a white and Quarteron. The children of a white and Quinteron are called Spaniards, and consider themselves as totally exempt from all taint of the negro race. Between the several tribes, or casts above enumerated, there are other intermediate classes, formed of an intermixture of the former. The several casts from the Mulattos affect the Spanish dress, but wear very slight stuffs, on account of the heat of the climate; and they compose the mechanics of the city. The class of negroes consists of the free and the slaves; and these are again subdivided into Creoles and Bozars, some of whom are employed in the cultivation of the lands belonging to the city. On account of the extreme heat, the only covering both of the males and females is a small piece of cotton stuff about their waist. The dress of the whites, both men and women, differs very little from that worn in Spain. The whole exercise of the females in the house consists in sitting in their hammocks, made of twisted cotton, and commonly knit in the form of a net, and swinging themselves for air. Thus they pass the greatest part of the day; and men, as well as women, often sleep in these hammocks. Of both sexes it is remarked, that they possess a considerable share of wit and penetration, and of a genius adapted to excel in all kinds of mechanic arts. But their faculties seem to attain an early maturity, and they retain them in a great degree of vigour to an advanced age. The females of every cast are distinguished by a mild and amiable disposition, and by the promptitude with which they relieve the indigent and distressed. The principal customs, in a great degree prevalent to this place, are the use of brandy, chocolate,

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chocolate, honey, sweatmeats, and smoking of tobacco ; and the latter practice is common among persons of all ranks and of both sexes. One of the most favourite amusements of the natives is a ball, or "fandango," which, among the populace, consists principally in drinking brandy and wine, intermixed with indecent and scandalous motions and gestures. Their burials are conducted with great pomp and ostentation ; and their lamentations over the dead are attended with the most frantic gestures and the most clamorous vociferations. The mourning is continued in the house of the deceased for nine days after the corpse has been laid in the grave.

The climate of Carthage is excessively hot ; the degrees of heat being continually the same as that of the hottest day at Paris. The nature of this climate is chiefly manifested from the month of May to the end of November, the season here called winter ; during which time, there is almost a constant succession of thunder, rain, and tempests ; and the rain descends in such quantities, that the streets appear like rivers, and the country like an ocean. This is the only opportunity which the inhabitants have for filling their cisterns with fresh water ; the water of their wells being thick and brackish. From the middle of December to the end of April the rains cease, and the weather is agreeable ; the heat being somewhat abated by the N.E. winds, which then set in. This season they call summer ; besides which they have another summer of short continuance about the festival of St. John. The invariable continuance of great heats occasions such profuse perspiration, that the complexion of the inhabitants appears wan and livid, and all their motions are sluggish. Yet upon the whole, they enjoy a good state of health, and commonly live even to 80 years and upwards. The singularity of the climate occasions disorders of a peculiar kind : some of which attack the Europeans upon their first landing ; and the others are common both to Creoles and Chapetones. Those of the first kind are rapid in their progress, and terminate fatally when they bring on the black vomit. The inhabitants of Carthage and its territory are very subject to the leprosy, in order to stop the contagion of which they have, without the city, a hospital called "San Lazaro," from the hill on which it stands, and in which persons of both sexes, labouring under this distemper, are confined. Another very singular distemper is the *cobrilla*, or little snake, which is a kind of tumour, which most commonly affects the arm, thigh, or leg ; and which they cure by first applying a suppurative plaister, and fomenting the whole tumour with oil, and then fastening a thread of silk to a kind of white fibre, that discovers itself, called the *cobrilla's* head, and winding the other end of it about a card, rolled up like a cylinder : they repeat the fomentation with oil, and the following day continue to wind about the cylindric card the part of the small fibre, which appears in sight, and thus proceed till the whole is extracted, and the patient cured. N. lat. $10^{\circ} 26' 35''$. W. long. $75^{\circ} 26' 45''$. Juan and d'Ulloa's Voyage to South America, by Adams, vol. i.

CARTHAGINIANS, in *Ancient History*, are supposed to have derived their origin from the Canaanites. See CANAAN and CANAANITES. They were called by the Greeks, sometimes Libyans, on account of the country they possessed ; and sometimes Phœnicians, on account of the country from which they were originally descended. The Romans styled them Pœni, or Phœnicians, for the same reason ; and every thing belonging to them, or their city, Pœnic, or Punic, that is Phœnician, or belonging to the Phœnicians. Between the Phœnicians and Carthaginians there always subsisted the strictest union. To this purpose Herodotus informs us (lib. iii.) that when Cambyses had determined to make war upon the

latter, the Phœnicians, who formed the chief strength of his fleet, positively declined to serve him against their countrymen ; and on this account he was obliged to lay aside his design. The Carthaginians, on their part, were never forgetful of the country from which they derived their origin. Accordingly, we learn from Polybius and Quintus Curtius, that they regularly sent every year to Tyre a ship freighted with presents, as a quit-rent or acknowledgment paid to their ancient country ; and its tutelary gods had an annual sacrifice offered to them by the Carthaginians, who considered them as their protectors. They never failed to send thither the first-fruits of their revenues, and also the tythe of the spoils taken from their enemies, as offerings to Hercules, one of the principal gods of Tyre and Carthage. The Tyrians, on the other hand, when they wished to secure their wives and children from Alexander, who was besieging their city, sent them to Carthage, where they were kindly received and hospitably entertained.

The language of the Carthaginians must at first have been the Phœnician ; and this was the same with that of the Canaanites or Israelites, that is, the Hebrew, or at least a language wholly derived from it. In process of time, however, considering their distance from Phœnicia, their mother-country, and their intercourse with other nations, their original tongue would be subject to some variation ; and yet, notwithstanding these variations, it ever continued to be the same in substance with the Hebrew or Phœnician. In the latter ages the Punic tongue acquired a tincture of the Chaldee and Syriac. As the island of Malta was, for a considerable time, subject to the Carthaginians, the Punic tongue must have long remained in it ; and it appears, that about the middle of the 16th century, there were some pillars in the island, which had Punic inscriptions upon them, and so late as that period the Punic tongue was spoken in Malta. The Punic letters, as well as language, must certainly at first have been the Phœnician ; and though time produced a change in them, yet they always retained a great resemblance of their original, as the curious inspector may discern in the characters that are found upon the most elegant Phœnician and Punic coins.

The first government settled at Carthage was probably monarchical ; but it expired either with Dido, or during her life, and was changed into a republic. Aristotle says, that it was partly aristocratical, and partly political, that is, democratical. According to Polybius, it was composed of monarchy, aristocracy, and democracy. But Isocrates represents the civil government as oligarchical, and the military as monarchical. Aristotle, who intimates, that the Cretan, Lacedæmonian, and Carthaginian republics were the most perfect of any in the world, gives the preference, in several respects, to the Carthaginian. Of its excellent constitution it has been alleged, as a striking evidence, that, notwithstanding the great authority vested in the people at Carthage, no instance occurred, from the foundation of the city to his time, of any popular commotions sufficient to disturb the public tranquillity, nor of any tyrant, who had been able, at the expence of liberty, to introduce oppression. Hence, it has been inferred, that the three principal powers, of which the constitution of Carthage was composed, were of such a nature as to counterpoise one another, and by their mutual harmony, to preserve the public tranquillity and promote the public happiness. These were the suffetes, the senate, and the people. The suffetes, *sophetim*, signifying, with the Hebrews and Phœnicians, judges, were two in number, of equal dignity and power, and the chief magistrates of Carthage. They corresponded to the two kings of Lacedæmon, as well as to the Roman consuls : and hence they are sometimes called kings and consuls. They were annually;

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annually elected out of the noblest families, and preferred on account of their virtue and talents, as well as their wealth. It was their province to assemble the senate, in which they presided, to propose subjects for deliberation, to tell the number of voices, and to superintend all emergent and decisive debates. Their authority was not limited to the city, nor confined to civil affairs, as they sometimes had the command of armies. Their concurrence with the senate in all points was necessary, in order to prevent any debate from coming before the people. Some say that they had the power of life and death, and that it was their prerogative to punish all sorts of crimes. Most cities of note in the Carthaginian dominions, as well as the metropolis, had their *suffetes*, or chief magistrates. When their employment expired, they were made *pretors*; and this was an office of considerable authority and influence.

The senate was composed of persons venerable for their age and experience, as well as illustrious for their birth, riches and merit. This honour was conferred upon them by election; but their number is not known. It was probably a numerous body, because we find that 100 were selected from the senate to inquire into the conduct of their generals. This was the grand council of state, in which every thing relating to peace and war, negotiations and alliances, trade and navigation, in short, to all affairs of moment, foreign or domestic, was debated, and, for the most part, determined. If the votes of the senate were unanimous, they had the force of laws, and from hence there lay no appeal. If they were divided among themselves, or disagreed with the *suffetes*, the affair was referred to the people, who had the liberty to express their sentiments freely, and of contradicting even the other parts of the legislature. What share of power belonged to the people, whilst the constitution remained in its most perfect state, does not appear. But it is probable, that they had a vote in the election of magistrates, and in the enacting of laws, particularly such as concerned themselves. In the time of Aristotle, the republic verged towards popular government; though the senate still retained a considerable degree of authority, and the power of the people was not uncontrollable; but about 100 years after, in the time of Hannibal, the senate was disregarded; the people arrogated to themselves almost the whole power; and ambitious demagogues obtained a very pernicious influence. From this period the public affairs were transacted by cabals and factions; the reputation and prosperity of the state began to decline; and this circumstance Polybius assigns as one of the chief causes of the ruin of Carthage.

The centumvirate, or tribunal of 100, consisted of 104 persons, corresponding to the Ephori of Sparta, and formed a tribunal, which was intended to balance the power of the nobles and senate; it served particularly to counteract the machinations of Mago, the Carthaginian general, and those of his family, who, by engrossing the chief employments of the state and army, had acquired the sole direction and management of all affairs. Of these 104 judges, five had a jurisdiction superior to that of the rest: and they had a power of filling all vacancies in their own body, and of choosing those persons who composed the tribunal of the hundred; under the *suffetes*, they were at the head of this tribunal, and upon them, in a great measure, depended the life, fortune, and reputation of all the citizens. None were elected into this office but persons of very distinguished merit; and it had no salary or reward annexed to it. The centumvirate was, probably, a perpetual office till the time of Hannibal, who caused a law to be passed, which required all the judges to be chosen annually, and that none should continue in office beyond that term. This took place about

200 years after the first establishment of the tribunal of 100. The principal, if not the only, civil officers, established at Carthage, besides the *suffetes*, were the *prætor*, who had great influence in passing and repealing laws, and to whom was committed the charge of the public revenues; the *quæstor*, who belonged to the bench of judges, who collected and managed the public money under the *quæstor*; and the *ensor*, whose business was to inspect the manners of the citizens.

The religion of the Carthaginians, as they were descended from the Tyrians, agreed at first in all points with that of the Phœnicians. But by their intercourse with the Greeks, they were led to adopt several new deities before unknown, and to blend some of the religious ceremonies of the Greeks with the Tyrian. Besides, by their extended commerce, they became acquainted with the various kinds of superstition established in other nations, which of course would give a tincture to their own; and hence it happened, that the religion of Carthage was a very gross and multifarious idolatry. It may be also presumed, that the Greek and Roman writers, in transmitting to us the history of these people, and of the objects of their worship, would affix the names of their own gods to those of the Carthaginians. The principal deity at Carthage was Chronus, or Saturn, to whom were offered in sacrifice children of the most distinguished families. We read that upon the signal defeat of the Carthaginian army by Agathocles, 300 citizens voluntarily sacrificed themselves in order to render him more propitious to their country. This deity had a brazen statue with extended arms, so disposed that a child presented to it dropped down into a hollow where was a fiery furnace. This deity, from various circumstances, appears to have been the Moloch or Milchem of Scripture, the famous idol of the Ammonites, Canaanites, and neighbouring nations. This is supposed to have been also the same god with the Baal, Bel, or Belus of the Sidonians, Babylonians, and Assyrians. The goddesses Cælestis, or Urania, was held in the highest veneration by the Carthaginians. This is supposed to have been the deity called by the prophet Jeremiah, (vii. 18. xlv. 17.) Baaeth Shemaim, the queen of heaven; by Megasthenes, in Eusebius, Beltis; by Sanchoniatho, Dione and Baaltis; and by Hesychius, Belthes, which name was applied both to Juno and Venus. St. Augustin informs us, that Venus established her reign at Carthage; and Virgil says, that Juno preferred that spot to all others. Astarte and Astarte were synonymous to Urania and Baaltis, and denoted the moon as well as Venus and Juno, who was invoked in great calamities, particularly in droughts, to obtain rain. Jupiter was worshipped by the Carthaginians under the name of Belus or Baal (see BAAL); Mars also was dignified by the same title; and so were likewise Bacchus and Apollo or the sun. Baal-samen, or Baal-shemaim, that is, the god of heaven, appears to have been the sun, and Belisama, or the queen of heaven, the moon. The Carthaginians introduced Ceres and Proserpina as Greek deities, and also Mercury, who received divine honours under the name of Asumes or Asoumes. The worship of the Tyrian Hercules was brought to Carthage by Dido, and diffused itself afterwards over all the coasts of Africa, and as far as Gades or Cadiz, where he had a magnificent temple. Besides other honours that were rendered to him at Carthage, he was annually gratified with human victims. Jolaut, as the relation of Hercules, was honoured as an object of veneration at Sardinia, which island was for a considerable time in the possession of the Carthaginians. The Dea Syria, or Syrian goddess, who is supposed to have been either Juno, or a group of all the goddesses, was a deity of the Carthaginians. The people of Carthage likewise addressed themselves to Æsculapius,

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Æsculapius, who had a spacious temple in the fortrefs of *Byrsa*. *Herebus*, another Carthaginian deity, is supposed to have been *Pluto*, or *Dis*. *Triton*, the sea-god, had also a place among the deities of Carthage. *Mopsus*, a famous sooth-sayer, had temples erected to his honour by the Carthaginians, and responses were issued from them, as from so many oracles. Rivers, meads, and waters, or rather the genii that presided over them, were objects of adoration with these people; and as the old Africans paid a religious homage to fire, this was probably the custom also at Carthage. The air and winds likewise shared divine honours. The sister of *Dido* passed for a goddess, under the name of *Anna Perenna*; *Dido* herself received similar honours after her death, and *Ovid* says, that in her life time she procured it for her husband *Sichæus*. *Tellus*, or the earth, was worshipped by the Carthaginians. Moreover, it is not unlikely that the Carthaginians adopted their famous generals, such as *Hamilcar*, *Hannibal*, and others, into the number of their gods; and that these were deities of the same kind with the *dii indigetes* of the Latins. The Carthaginians also ranked among their gods the two *Philæni*, who, for the purpose of extending the territory of Carthage, consented to be buried alive in the place which they had pitched upon for its boundary. Portable temples were in use among the Carthaginians; which were covered chariots that carried small images representing certain gods. The tabernacle of *Moloch*, mentioned in scripture, is thought to have been a machine of this kind. The *Cabiri* were likewise adored at Carthage (see *CABIRI*); and also the *Anaces*, *Anactes*, or *Dioscouri*. The gods, called *Patæci*, had the same respect from their votaries the Phœnicians and Carthaginians as the *Penates* had from the Romans. The custom of offering human sacrifices to these gods continued in Carthage till the ruin of their city; nor did it cease among the Africans till the proconsulate of *Tiberius*; who ordered the priests concerned in this horrid impiety to be hanged. We may observe, in general, that the Carthaginians were extremely addicted to superstition; and yet they seemed to be influenced by some good principles; for it was their custom to address themselves to the gods before they attempted to execute any enterprise, and, after having gained any advantage, they made proper acknowledgment to superior powers.

In this connection it may not be improper to say something on the character of the Carthaginians. As they were intent upon amassing wealth, they were mean-spirited, groveling, and sordid, to an incredible degree. This at least seemed to have been their disposition towards the decline of their state, though in their earlier ages they were of a superior turn of mind, and even to the last, they had some persons among them who possessed generous and heroic spirits. In forming an opinion of these people, we should remember, that their character is transmitted to us chiefly by the Romans, who were their avowed and implacable enemies; and who took care to destroy not only the Punic archives, but every record of Punic literature, or of true history. Of the Carthaginian perfidiousness and ingratitude, their history will furnish abundant proof. Craft and cunning, which, according to *Cicero*, were the distinguishing characteristics of the Carthaginians, naturally led to falsehood, hypocrisy, and breach of faith, and these terminated in the basest frauds and the most perfidious actions. These qualities of the Carthaginians were so notorious, that, to signify any remarkable dishonesty, it was usual to call it "*Punic Honour*," "*Fides Punica*;" and to denote a knavish, deceitful mind, no expression was thought more proper than "*Ingenium Punicum*," a Carthaginian mind. *Plutarch* describes them as actuated by a morose, saturnine, and savage disposition; utterly averse

from every thing that had the least appearance of wit or raillery. Some of them were vain, arrogant, and ambitious to a very high degree, and, indeed, avarice and ambition seemed to be with many of them ruling passions.

As commerce, the army, and the marine, were the principal objects of attention at Carthage, and as these engaged the pursuits and engrossed the thoughts of the people in general, we cannot expect to find that they should have cultivated any very distinguished taste for the liberal arts and sciences. However, they must have been acquainted with the rudiments of astronomy, without which they could not have been tolerably versed in the art of navigation. They had some notion likewise of sculpture and painting, as we may learn from the statues of their *dii patæci*, which they carried with them in their voyages, and from the pictures with which their ships of war and other vessels were adorned. They must also have made a considerable proficiency in the inferior mechanical arts; as we may undeniably conclude from their superb temples, magnificent palaces, rich furniture, and great variety of arms, and domestic utensils. Their records of literature were destroyed by the Romans; nevertheless, the names of their principal writers have been transmitted with honour to posterity. *Hannibal*, it is said, was well acquainted with the Greek, and wrote several pieces in this language. *Mago*, another celebrated Carthaginian general, composed 28 volumes upon husbandry, which, after the taking of Carthage, were held in such high estimation by the Roman senate, that they ordered them to be translated into Latin. *Philius*, who wrote a history of the wars betwixt the Romans and the state of Carthage, is reckoned by *Polybius* a good though a partial historian; but no part of his work is extant. *Himilco*, a sea-officer, who was deputed by the senate of Carthage to discover the western shores and ports of Europe, wrote a journal of his voyage, together with an account of his discoveries. *Hanno*, another Carthaginian general, sailed, by order of the senate, along the coast of Africa. Having entered the ocean through the straits of Gibraltar, he arrived first at the island of *Cerne*, supposed to be the modern isle of *Arguim*, which became the chief station of the Carthaginians on that coast; proceeding thence he reached a promontory, which he called the "*West Horn*," probably *Cape Palmas*; and from this he advanced to another promontory, which he named the "*South Horn*," which is the present *Cape de Tres Palmas*, about 5 degrees N. of the line. He wrote a relation of his voyage, and a Greek fragment of it is still remaining; the authenticity of which some have doubted. See *AFRICA*.

Among other inventions ascribed to the Carthaginians, that of the quadriremes, or four-oared galleys, deserves mention; and it is not improbable, that they were the first who made cables of the shrub "*spartum*" (see *CARTHAGENA*); at least they were the first who communicated this invention to the Romans. Their navigation was extended to all the ports of the Mediterranean, both to the east and to the west; Britain and the Canaries are said to have been known to them; the western coast of Africa they were acquainted with to a considerable extent, as we have already observed; and some have asserted, but without sufficient evidence, that their nautical skill had led them to traverse the ocean and to visit the coast of America. They were, however, without doubt, for a long time universally acknowledged masters of the sea. It must be allowed, that, with the exception of those already mentioned, to whom we may add *Clitomachus* the philosopher, called in the Punic language *Afdrubal*, and the celebrated poet *Terence*, who was born at Carthage, the Carthaginians could not boast of their men of literature and science; although they had a correspondence with Greece and the most civilized nations, their views were directed to trade;

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trade; nor do they seem to have had any emulation to avail themselves of their learning. Eloquence, poetry, philosophy, and history seem to have been little known among them; and the education of youth, though Carthage was provided at an early period with an excellent school, must have been very much neglected. The knowledge that was principally sought and valued was restricted in a considerable degree to writing, arithmetic, book-keeping, and the buying and selling of goods; so that it was subordinate to traffic. In the latter years of their state the laws forbade any Carthaginian to learn the Greek tongue, lest it might qualify him for carrying on a dangerous correspondence with the enemy, either orally or by letter.

After all, *commerce*, independently of the wars in which they were engaged, must occupy the chief place in the history of the Carthaginians. This formed the greatest strength and chief support of their commonwealth, and we may venture to affirm, that the power, the conquests, the credit, and glory of the Carthaginians, all flowed from trade. From their Tyrian progenitors they inherited their genius for commerce, and in process of time eclipsed the glory of their ancestors, inasmuch that Pliny derives the origin of trade, not from the Phœnicians, but from the Pœni or Carthaginians. The natural fertility of its soil, the surprising skill of its artificers, and its peculiarly happy situation for commerce, rendered Carthage the centre of traffic, the great mart, not only of the Mediterranean, but even of the most remote nations. Without contending for the trade of the east with their mother-country, they extended their navigation chiefly towards the west and north. Following the course which the Phœnicians had opened, they passed the straits of Gades, and visited not only all the coasts of Spain, but those of Gaul, and penetrated at last into Britain. They also extended their researches towards the south, and planted along the western coast of the great continent of Africa several colonies, in order to civilize the natives, and accustom them to commerce. They made considerable progress, by land, into the interior provinces of Africa, traded with some of them, and subjected others to their empire. The commodities with which they supplied other countries, seem to have been corn and fruits of all kinds; divers sorts of provisions, and high fauces; wax, honey, oil, and the skins of wild beasts, all the natural produce of their own territories. Their staple manufactures were utensils, toys, cables, all kinds of naval stores, and the colour from them called Punic, the preparation of which seems to have been peculiar to themselves. From Egypt they fetched fine flax and paper; from the coasts of the Red Sea, spices, frankincense, perfumes, gold, pearls, and precious stones; from Tyre and Phœnicia, purple and scarlet, rich stuffs, tapestry, costly furniture, and various artificial curiosities; from the western parts of the world, in return for the commodities carried thither, they imported iron, tin, lead, and copper. By thus purchasing the superfluities of all nations, with which they had intercourse, at an easy price, and selling them at an advanced rate, they brought immense treasures to Carthage, rendered this republic formidable to her neighbours, and enabled her to contend with Rome itself for the empire of the world.

The gold and silver mines of Spain furnished the Carthaginians with an inexhaustible source of wealth. Polybius, quoted by Strabo, says, that in his time upwards of 40,000 men were employed in the mines near Nova Carthago, and supplied the Romans, at a subsequent period, every day with 25,000 drachmas, or 859l. 7s. 6d. sterling. Besides, the Carthaginians carried on, by means of their caravans, an annual intercourse with the Persians, Garamantes, and Ethiopians; and brought from these remote nations, together with other

rich commodities, carbuncles of incalculable value; which gems, from the plenty of them at Carthage, were called by the ancients Carchedonian or Carthaginian. We may add, that no profession was more honourable than that of the merchant in the dominions of this state; nor is this any wonder, when we consider the numberless advantages that accrued from it. Herodotus (lib. iv.) mentions a singular mode of carrying on traffic between the Carthaginians and the Libyans, who bordered on the sea-coasts, beyond the straits or pillars of Hercules. After they had run into some creek, they landed their goods, and leaving them exposed on a point of land, returned on board their ships. They then caused a great smoke to be raised, at the sight of which the Libyans came to the spot where the wares had been left, and laying down a quantity of gold, retired to a distance. The Carthaginians went on shore a second time, and if the gold appeared to them sufficient, they carried it off and sailed without delay; if not, they remained quiet on board their ships for some time. The Libyans, finding they were not satisfied, made an addition to what they had before deposited; and they continued increasing the quantity of gold, till the Carthaginians were satisfied and the bargain made. Neither of these nations offered the least injustice to the other. The Carthaginians did not touch the Libyan gold till it was of equal value with their wares; nor did the Libyans meddle with the Carthaginian merchandise till the gold they offered as an equivalent was accepted and taken away. A similar mode of traffic seems to subsist among the Bedas of Ceylon. See BEDAS.

In order to sketch out the history of the Carthaginians, as our limits will not admit of a minute detail, we shall distribute the duration of their state, which, according to Appian, was 700 years, and which others make 746 years, but which we shall lay down, conformably to the testimony of Cato, sanctioned by Solinus, at 737 years, into three distinct periods or epochs. The first commences with the foundation of Carthage, in the year 883 B. C. and extends to the invasion of Sicily, in the year 480 B. C.; comprehending an interval of 403 years. The second extends from this invasion to the rupture with the Romans, in the year 264 B. C. or the commencement of the first Punic war, being an interval of 216 years. The third period lasted 118 years, during which the three Punic wars occurred; the first continued 24 years, from the year 264 B. C. to 241 B. C.; the second continued 17 years, from the year 218 B. C. to 201 B. C.; and the third continued 4 years, from the year 149 B. C. to 146 B. C. when Carthage was destroyed.

The *first period*, according to the above distribution, is imperfectly known. We have already stated (see CARTHAGE) that Elisa, known by the name of Dido, fled from Tyre in the 7th year of the reign of Pygmalion, king of that city, and landing on the coast of Africa, founded either the city of Carthage, or at least the citadel of Byrsa. For 300 years after the tragical death of Dido, there is a chasm in the history of the Carthaginian state. During this period their whole attention seems to have been engaged in the extension of their commerce, and in forming establishments, with this view, in various parts of the world. It appears that at a very early period this republic had made considerable acquisitions in Sicily and Sardinia, and other places; and that it was formidable by sea in the time of Cyrus and Cambyfes. This latter prince, in the 6th year of his reign, was obliged to abandon an expedition which he had projected against the Carthaginians, because the Phœnicians would not succour him; and hence it appears, that the whole naval power of the Persian empire was unable to contend with that of Carthage, without the assistance of the Tyrians. In the year 508 B. C. the year after the re-
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gulf, the Carthaginians concluded a treaty with the Romans, chiefly relating to navigation and commerce; and they were the first people out of Italy with whom the Romans entered into an alliance. From this treaty, which was signed 28 years before Xerxes invaded Greece, we learn, that the whole island of Sardinia, and part of that of Sicily, were then subject to the Carthaginians. At this time they were well acquainted with the coasts of Italy; and they manifested on various occasions a jealousy of the enterprising spirit and growing power of the Romans; nor would they permit them to sail beyond the promontory called the "Fair Promontory," lying to the north of Carthage, lest they should discover the fertility of the land, as well as the favourable situation of the cities, and be tempted to make a settlement. Under Mago, a Carthaginian general of consummate abilities and merit, and who is said to have first introduced military discipline among the soldiery, the dominions of Carthage were much enlarged, its commerce extended, its riches increased, and virtue alone was countenanced both in the army and the state. He left the country in the most flourishing condition, and was succeeded in his high employments by his sons Asdrubal and Hamilcar. To them was committed the command of the army against Sardinia, which had revolted, and in the war that was prosecuted on this occasion, Asdrubal was mortally wounded. His death was much lamented by the Carthaginians. About this time the Carthaginians, determined to shake off the African yoke, by discontinuing the tribute which, by their original contract, they were obliged to pay, declared war; but being unsuccessful, it was terminated by a treaty, the chief article of which required, that the tribute as at first imposed upon them for the ground on which the city stood, should be continued. In process of time, however, the tribute was abolished. It was about this time that Darius Hystaspis, king of Persia, sent an embassy to Carthage, requiring the inhabitants to abstain from human sacrifices, and from eating dog's flesh; to burn their dead, and not to bury them, as had been the usual practice; and to furnish him with a body of auxiliary forces to serve in the war which he had declared against Greece. With the last article the Carthaginians did not think proper to comply, because their troops were otherwise engaged. Towards the close of Darius's reign, it seems probable that an offensive and defensive league was formed betwixt these two powers; however, it is certain, that an alliance was entered into between Xerxes, the successor of Darius, and the states of Carthage; and that the Carthaginians engaged to invade Sicily with all their forces, and endeavour to drive the Greeks from thence, as well as the continent of Italy, whilst that prince marched in person, with the whole strength of the Persian army, against Greece itself. The first settlement of the Carthaginians in Spain must have preceded the period of which we are now speaking; and it is most probable that the nerves of their power were the mines of Spain, by which they were enabled to equip such powerful fleets and collect such formidable armies; and that, by their assistance, they made such extensive conquests in Sicily and Africa. But, though the first Carthaginian settlement in Spain must have preceded the reigns of Xerxes and Darius, and even that of Cyrus, and have occurred when the city of Gades, now Cadiz, was in its infancy, yet we learn from Livy and Polybius, that the greatest part of Spain remained unsubdued till the wars of Hamilcar and Hannibal. Diodorus Siculus informs us, that the Carthaginians sent a colony into the island Ebusus, or Eresus, now Yvica, 160 years after the foundation of their city; and it is highly probable, that about this time the Balearic islands, now called Majorca and Minorca, were likewise either planted or reduced by the same people, and that they were

furnished by these islands with the most expert slingers in the world, who did them great service in their battles and sieges. See *BALEARES Insulæ*. To this period also it is reasonable to refer the first descent of the Carthaginians in Spain. As Sardinia was in the possession of the Carthaginians when they made their first treaty with the Romans, we are warranted in concluding that Corsica, separated from the former by a strait of about 3 leagues in breadth, was possessed by them, either wholly or in part, in very ancient times; and Herodotus expressly informs us, that the Cynrians, or Corsicans, were one of those nations which enabled the Carthaginians to form that great army, with which they invaded Sicily, in the days of Gelon.

After the conclusion of the treaty with Xerxes, already mentioned, the Carthaginians, in pursuance of their engagements, made great preparations for war against the Greeks of Sicily, both by sea and land. This brings us to the *second period* of the history of Carthage, which commenced with the year 481 B. C. The preparations for this expedition lasted 3 years, and large sums of money were sent by Xerxes from Persia to assist the Carthaginians in completing them. When every thing was ready, Hamilcar, the son of Hanno, according to Herodotus, but of Mago, according to Justin, was appointed to the command; and he sailed from Carthage with 300,000 men, composed of different nations, and a fleet of above 2000 ships of war, with 3000 transports, not doubting to make an entire conquest of Sicily in the first campaign, B. C. 480. Notwithstanding an ominous disaster in the passage, by which the horses and chariots of Hamilcar perished in a storm, the general, on his arrival at Panormus, now Palermo, endeavoured to dissipate the gloomy apprehensions of his followers, by representing the certainty of success, and expressing his fear lest the Sicilians, by reason of the storm, would escape the danger that threatened them. Having laid siege to Himera, he was attacked by Gelon and Theron, the tyrants of Syracuse and Agrigentum, with their united forces; and after a long and bloody contest, Hamilcar was slain, and the whole Carthaginian army either put to the sword, or obliged to surrender at discretion. The Carthaginian fleet was likewise totally destroyed. The news of this defeat arrived at Carthage by one small boat, the solitary remnant of their fleet; and produced lamentation and terror through the whole city. Such was the indignation which this disaster produced in the public mind against Hamilcar, that, notwithstanding all his past services, it was determined to make his family suffer; and therefore Gisco, his son, was banished, and retiring to Selinus, he died there for want of necessaries. Gelon granted the Carthaginians peace on the following terms: that they should pay two talents of silver towards defraying the expences of the war;—that they should build two temples (one to Ceres and another to Proserpine) where this treaty should be deposited, and at all times be exposed to public view;—and that, for the future, they should abstain from human sacrifices. From this time to the close of the 92d, or beginning of the 93d olympiad, B. C. 409 or 408, the Carthaginians are scarcely mentioned in the Sicilian history; though during this interval they turned their arms against the Moors, Numidians; and other African nations, and greatly extended their frontiers in Africa; they also released themselves from the tribute which they had been accustomed to pay, and became absolutely independent. They had likewise warm disputes with the people of Cyrene, the capital of Cyrenaica, and after shedding much blood, accommodated their differences by the interposition of two brothers, called Philæni, who extended their territory, and consented to be buried alive in the place fixed upon as their boundary. See *PHILÆNI*. In the year B. C. 409, the Egestines, or Segestans, who had declared in favour

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of the Athenians, against the Syracusans, dreading their resentment, and being actually attacked by the people of Selinuntum, implored the aid of the Carthaginians; and for their more effectual succour, Hannibal, one of the Suffetes, grandson to Hamilcar, and son to Gisco, who had been exiled, was entrusted with the command of an army, consisting, as some say, of 200,000 foot and 4000 horse, or, according to others, of about 100,000. Having captured Selinuntum, or Selinus, with circumstances of peculiar barbarity, and also Himera, he returned to Carthage, laden with spoils, and was received with loud and joyful acclamations. The Carthaginians, elated with this success, meditated the reduction of the whole island of Sicily; and in the year B.C. 406, they deputed Hannibal, aided, on account of his age and infirmities, by Imilcar, or Imilcon, the son of Hanno, with a large fleet and army, for this purpose. The campaign was opened with the siege of Agrigentum, which, after a vigorous resistance, was taken and plundered, and laid in ruins. See AGRIGENTUM. Gela and Camarina shared the same fate. This war was terminated by a treaty with the tyrant Dionysius; after which Imilcar, whose army had been much weakened by the casualties of war, and by the plague, which had broke out in it, returned to Carthage, where this disorder made dreadful havock, as it also did in other parts of Africa.

Dionysius, having by the fore-mentioned treaty gained time for establishing his authority at Syracuse, began his preparations for renewing the war with the Carthaginians; and when he had fortified the city and completed his naval and military arrangements, he communicated his design to the Syracusans, which was that of instantly attacking the Carthaginian territories, without a previous declaration of war. Accordingly in the year 397, B.C., he commenced hostilities, by abandoning to the fury of the populace the persons and the possessions of the Carthaginians who resided at Syracuse, and traded on the faith of treaties. This example of perfidiousness and barbarity was followed throughout the whole island of Sicily. Having thus begun, he dispatched a herald to Carthage, with a message to the senate and people, requiring them to withdraw their garrisons from all the Greek cities in Sicily, and threatening them, on refusal, with treating all the Carthaginians that were found in them as enemies. This intelligence occasioned a general alarm through the city, which the plague had already reduced to a very miserable condition. But the Carthaginians, though alarmed, were not intimidated; nor did they lose any time in preparing for defence, and in collecting an army, the command of which they conferred on Himilco. Dionysius, without waiting for their reply, put his army in motion, and opened the campaign with the siege of Motya, which was the magazine of the Carthaginians in Sicily; and after a long and obstinate resistance, the city was taken by storm, and all the inhabitants put to the sword, those excepted who took sanctuary in the temples. Himilco, unable to prevent its capture, returned to Africa; but in the following year he was appointed one of the suffetes, and returned to Sicily with a far greater army than before. He landed at Panormus or Palermo, took several cities, and recovered Motya by force of arms. Animated by these successes, and also by the capture of Messina, he advanced towards Syracuse, with a design of besieging it; marching his infantry by land, whilst his fleet, under the command of Mago, sailed along the coast. His army consisted, as some say, of 300,000 foot, and 3000 horse, or as others say, 30,000 foot, and his fleet of 200 ships, and 500 barks. Whilst he was making progress in the siege, a contagious distemper made dreadful havock among his troops. Dionysius availed himself of this favourable opportunity for attacking the

Carthaginian forces; whilst most of the ships were either taken or burnt, great slaughter was committed in the Carthaginian camp; and Himilco, by a private capitulation with Dionysius, and for the sum of 300 talents (54,000*l.* according to some, or by another estimate 61,800*l.*) obtained permission to depart in the night, with all the surviving citizens of Carthage, to Africa. The remainder of his army was left to the mercy of the conqueror. The Carthaginians received intelligence of this disastrous event with inexpressible grief and consternation; and Himilco, unable to survive his misfortune, and bemoaning his own fate and that of his country, put an end to his own life. The news of Dionysius's success induced the Africans to revolt from the Carthaginians, whom they naturally hated, and against whom they were now particularly incensed for having saved only their own citizens, and for having left the confederates to the mercy of the enemy. Accordingly an army of 200,000 effective men was soon collected; and having taken Tunis in their march, they advanced towards Carthage; but, destitute of experienced commanders, and unaccustomed to military discipline, they were soon obliged to disperse, and Carthage was delivered from one of the most imminent dangers that ever threatened it. Notwithstanding the great losses which the Carthaginians had sustained in the course of this war, which lasted about five years, they could not forbear making new attempts upon the island of Sicily; and an army of 80,000 men was committed to the conduct of Mago. Although he gained many advantages, he found himself in an enemy's country, and distressed for want of provisions, he thought it most prudent to conclude a treaty of peace with Dionysius, and to return to Carthage. For nine years after this peace the Carthaginians seem to have enjoyed uninterrupted tranquillity; but in the second year of the 99th olympiad, B.C. 383, Dionysius, meditating a war against them, formed a project for improving his finances, that he might be enabled to carry it on with success. The Carthaginians, apprised of his intentions, strengthened themselves by alliances with their neighbours, and adopted all other necessary measures for self-defence. After some alternate successes and defeats, Mago, the Carthaginian general, and son of the former general, who lost his life at the battle of Cabala, concluded a peace with Dionysius upon condition of his ceding to the Carthaginians the city and territory of Selinus, as well as that part of the district of Agrigentum, bordering on the territory of Selinus, and extending as far as the river Halycus, and also of his paying them 1000 talents towards defraying the expenses of the war. Between three and four years after the conclusion of this war, (B.C. 378,) Carthage suffered much from the plague, which swept away a very great number of its inhabitants. The Africans and Sardinians took the advantage of it, and made some attempts for throwing off a yoke which was hateful and grievous; but their efforts were ineffectual, and they were soon reduced to their former allegiance. Towards the beginning of the 103d olympiad (B.C. 368) Dionysius, emboldened by the weakened state of Carthage, formed an enterprise in Sicily, which was unsuccessful and terminated in a truce; but he did not long survive this event. This truce was changed by his son and successor, Dionysius II., into a perpetual peace. Soon after this time, A. U. C. 402, (B.C. 352) the Carthaginians concluded a second treaty with the Romans, nearly of the same tenor with the first, excepting that the inhabitants of Tyre and Utica were expressly comprehended in it, and joined with the Carthaginians. After the death of the elder Dionysius, Syracuse was involved in great troubles; and Dionysius, the reigning prince, was under a necessity of quitting his throne, and continuing 10 years in exile; but he was afterwards

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wards restored, and found means to reinstate himself in his dominions. However, his temper was savage and brutal, and he exercised great cruelties among his subjects. This seemed a favourable opportunity for the Carthaginians to make themselves absolute masters of Sicily; and accordingly they equipped a large fleet, and entered into an alliance with Ictas, tyrant of the Leontines, who had taken Syracuse under his protection. The two powers engaged, by this treaty, to unite their forces in order to expel Dionysius; and, after his expulsion, to divide Sicily between them. The Syracusans, discovering this design, applied to the Corinthians for assistance; who sent over Timoleon, a general of consummate abilities, and an ardent friend to liberty, with a body of troops to their assistance. Accordingly, in the year B. C. 345, he set sail from Corinth for Sicily with 10 ships and 1000 soldiers, and pursuing his voyage over the Ionian sea, he arrived safely, with his small fleet, at Metapontum, on the coast of Italy. From thence he advanced to Rhegium, where, by a happy stratagem, he eluded the vigilance of the Carthaginians, and landed his forces at Taurominium in Sicily. Timoleon, with his small force, advanced boldly to the relief of Syracuse; and made his way into one part of the town before the enemy had any notice of his approach. Here he defended himself with such resolution that he could not be dislodged by the united powers of Ictas and the Carthaginians. Dionysius, having surrendered the citadel to Timoleon, with all the forces, arms, and ammunition in it, escaped, by his assistance, to Corinth: and a dissatisfaction having taken place among Mago's soldiers, in consequence of an artful representation made by the emissaries of the Corinthian general, that it was astonishing to see Greeks, who formed a great part of the Carthaginian army, using their endeavours to make barbarians masters of Sicily, from whence they would, in a very little time, pass over into Greece; Mago himself, wanting a pretence to retire, intimated that his forces were about to betray and desert him, and, therefore, sailed with his fleet out of the harbour, and steered for Carthage. Ictas could not maintain his position against the Corinthians; and thus they got possession of the whole city. Mago, on his arrival at Carthage, was impeached; but he prevented the execution of the sentence passed upon him, by a voluntary death. The Carthaginians, with a view of repairing the losses they had sustained, levied new forces, and sent to Sicily a greater and more powerful fleet than the former. It consisted of 200 ships of war, besides 1000 transports; and the army amounted to upwards of 70,000 men. They landed at Lilybæum; and Timoleon, with 7000 men, marched out to meet them. Of the 4000 mercenaries, which composed his small army, a thousand deserted upon the march to the river Crimæsus or Crimisa, on the banks of which the enemies were encamped: and yet, with perfect confidence in the valour of his own soldiers, he was determined to hazard a battle. The event justified his expectation; the Carthaginians were completely routed; more than 10,000 fell on the field of battle, of whom 3000 were Carthaginian citizens, and 2500 formed what was called the sacred cohort, so that this event filled their city with mourning and consternation. Their camp was taken; and with it immense riches, and a great number of prisoners. This memorable battle was fought on the 27th day of the month Thargelion (June 13th) B. C. 340. It was followed with a treaty of peace, between Timoleon and the Carthaginians, which stipulated that all the Greek cities should be declared free; that the river Halycus or Lycus should be the boundary between the territories of both parties; that the natives of the cities subject to the Carthaginians should be allowed to withdraw, if they pleased, to Syracuse, or its dependen-

cies, with their families and effects; and that Carthage should not for the future afford any assistance to the remaining tyrants against the Syracusans. It was about this time that Hanno, an opulent and powerful citizen of Carthage, formed a design of subverting the constitution, and introducing arbitrary power. With a view to the accomplishment of this project, he proposed to invite the senators to a grand feast made on occasion of his daughter's marriage: and by mixing poison with wine to destroy them all; not doubting but such a tragical event would at once make him master of the republic. The plot was discovered, but Hanno's interest in the city was so great, that the government could not venture to punish him, even for so execrable a crime. Hanno, finding that his first stratagem was defeated, had recourse to arms, and collected together all his slaves for the execution of his purpose. This plot was also discovered. In order to avoid merited punishment, he retired with 20,000 armed slaves to a castle that was strongly fortified, and from thence sought the assistance of the Africans, and of the king of Mauritania; but when all his projects had failed, he was taken prisoner, and carried to Carthage; where, after being severely scourged, his eyes were put out, his arms and thighs broken; and at last he was executed in the presence of all the people, and his body was suspended on a gibbet. His children and all his relations, though they had not participated his guilt, shared his punishment. They were all sentenced to die, that not a single person of his family might survive, either to imitate his crime or to revenge his death. It was probably about this period, or somewhat later, that the Tyrians sent ambassadors to Carthage, to implore assistance against Alexander, but being incapable of sending them any succour, they dispatched 30 of their principal citizens to Tyre, to condole with them on this afflictive occasion, and to express their concern, that the bad situation of their own affairs would not permit them to spare any troops. The Carthaginians themselves, when they heard of Alexander's progress in the East, began to entertain apprehensions for their own safety; and deputed Hamilcar, or as Gellius says, Asdrubal, surnamed Rhodanus, a person of wonderful address and eloquence, to wait upon that prince; and having been introduced to him by means of Parmenio, he so far insinuated himself into his favour, as to have the honour of attending him in all his future expeditions. Having obtained this degree of confidence with Alexander, he did signal service to his country, by communicating many important discoveries relating to the conqueror's schemes. Although the treachery of this Carthaginian escaped the discovery, or even the suspicion of Alexander, he was, after his return to his own country, notwithstanding all his services, considered as a betrayer of his country, and was accordingly put to death at Carthage, by a sentence as barbarous as it was ungrateful. About the year 319 B. C. Agathocles, a Sicilian, of obscure birth and low fortune, rose into notice; and supported at first by the power of the Carthaginians, he invaded the sovereignty of Syracuse, and made himself tyrant over it. In the infancy of his power, the Carthaginians kept him within bounds, and Hamilcar, their chief, forced him to agree to a peace, which restored tranquillity to Sicily. But he soon infringed the stipulated articles of it, and declared war against the Carthaginians themselves, who under the conduct of Hamilcar, obtained a signal victory over him, near Himera, in the year B. C. 310, and forced him to shut himself up in Syracuse. The Carthaginians pursued him thither, and laid siege to that important city; and if they could have taken it, they would have gained possession of all Sicily. Agathocles, finding himself deserted by his allies from an abhorrence of his cruelties, formed a most daring,

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and to appearance, an impracticable scheme, of transferring the war to Africa, and investing Carthage, at a time when he himself was besieged, and had only one city left in Sicily. His profound secrecy in the execution is no less astonishing than the design itself. Without imparting his scheme to any confidential friend, he merely declared that he had discovered an infallible method of rescuing the Syracusans from the dangers that surrounded them; that some inconvenience would attend a short siege; but that those who chose to escape, might freely leave the city. Sixteen hundred persons quitted it; and all slaves who were able to bear arms were set at liberty, and joined his forces. With a flock of 50 talents for the supply of his present wants he set sail with two of his sons, without informing either of his followers whither he intended to direct his course. The Carthaginians endeavoured to prevent the departure of the fleet, but Agathocles eluded their pursuit, and made his escape to the main ocean. When he arrived in Africa, he communicated to his troops the design of this expedition and the motives that had prompted him to undertake it. The soldiers heard his speech with acclamations; flattered themselves with the prospect of success; and thought that they were already masters of Carthage. As he approached the city, the inhabitants were alarmed, and could not help imagining that their army before Syracuse had been defeated and their fleet lost. After some deliberation, they resolved to arm the citizens; and with 40,000 foot, 1000 horse, and 2000 armed chariots, under the command of Hanno and Bomilcar, they marched to meet the enemy, whose force consisted of 13 or 14,000 men. The battle was obstinate and bloody; at length Hanno and the sacred cohort, who long sustained the fury of the Greeks, were overwhelmed with a shower of stones, and the general fell, sword in hand; while Bomilcar proved treacherous, retired with the army under his command, and left the field to Agathocles.

After this defeat, the Carthaginians determined to recall Hamilcar from Sicily; accordingly he raised the siege of Syracuse, withdrew his troops from the place, and sent a detachment of 5000 men to reinforce the troops in Africa. Hamilcar and his remaining forces were attacked by the Syracusans; upon which, being deserted by his army, which before the engagement amounted to 120,000 foot, and 5,000 horse, he was taken prisoner and carried into Syracuse. In the mean while Agathocles, having gained several advantages in Africa, was preparing to besiege Carthage itself; and advancing to the camp of the Carthaginians which covered the city, he communicated to them the distressing intelligence of the total destruction of their army in Sicily. This news filled them with consternation, and Carthage itself would have been lost, if an unexpected mutiny had not occurred in the camp of Agathocles, which proved almost fatal to the tyrant himself, and gave the Carthaginians an opportunity of rallying and recovering strength. This was followed by an indecisive battle betwixt Agathocles and the Carthaginians, who had sent an army to punish and reclaim Numidia, which had revolted. During these transactions, Bomilcar, who possessed the first employment in the state, attempted to effect a revolution at Carthage, and to obtain the sovereignty of that city, to which he had long aspired. A dreadful massacre was the means by which this revolution was to be accomplished; but as soon as it was known that Bomilcar was the cause of this disturbance, and that he had caused himself to be proclaimed king of Carthage, the indignation of the people was roused; the traitor was apprehended, and executed on a cross in the middle of the forum; and thus the Carthaginians were rescued from the most dangerous domestic enemy their state had ever produced. Aga-

thocles finding himself at the head of a numerous army, assumed the title of king of Africa, and proposed soon to complete his conquests in that country by the reduction of Carthage. But after having taken Utica, he was diverted from his further progress by a commotion in Sicily, which required his presence. His son Archagathus, with whom he had entrusted the command in Africa, was for some time successful in extending his conquests; his career of victory, however, was interrupted by some decisive advantages gained on the part of the Carthaginians; and it became necessary to summon Agathocles from Sicily. Upon his arrival in Africa, he took the earliest opportunity that occurred of attacking the Carthaginian camp, but met with a total defeat. This disaster, together with some other unfavourable circumstances that happened, induced Agathocles to quit Africa. After his departure his two sons were assassinated by the soldiers, (B. C. 285.) who, chusing leaders from among themselves, concluded a peace with the Carthaginians, which was in the following year ratified by Agathocles. The Carthaginians by this peace had all the cities restored to them, which they had formerly possessed in Sicily, and deriving this advantage from the termination of the war, they left Agathocles at liberty to pursue his designs in Sicily. Urged by his implacable hatred to the Carthaginians he prepared for a new war; but this, and other projects which he had formed, were frustrated by his death, B. C. 283. In the year, B. C. 280, Pyrrhus, king of Epirus, turned his arms against Italy; but before he landed, the Romans renewed their treaties with the Carthaginians, with an additional engagement of mutual assistance, if either of the contracting powers should be attacked by this prince. Accordingly the Carthaginians, as soon as they heard of Pyrrhus's descent in Italy, sent a fleet of 120 sail under the command of Mago; who, in an audience before the senate, signified the concern with which his principals had heard of the hostilities of Pyrrhus, and offered, in the name of his republic, a body of auxiliary troops to enable them to repel their foreign invader. The senate returned thanks for this obliging offer of the Carthaginians; but at the same time declined accepting it. Some days after this interview with the senate, Mago repaired to Pyrrhus, on pretence of offering the mediation of Carthage for terminating his quarrel with the Romans; but the real motive of this visit was to discover, if possible, what were his designs with regard to Sicily, which common fame reported he was going to invade. The Syracusans, indeed, who had been for some time besieged by the Carthaginians, had sent pressing intreaties for succour to Pyrrhus. Accordingly he at last sailed from Tarentum, passed the strait, and arrived in Sicily. His conquests were at first so rapid, that he left the Carthaginians, in the whole island, only the single town of Lilybæum. To this he laid siege, but finding a vigorous resistance, and being summoned back to Italy, he gave up his design. Upon his departure, Sicily immediately returned to its former masters; so that he lost the island with the same rapidity that he gained it. As he was embarking, turning his eyes back to Sicily, he exclaimed, "what a fine field of battle do we leave to the Carthaginians and Romans!" and his prediction was soon verified. After his departure, Hiero was appointed prator of Syracuse and general of the Syracusan army. Under his command, they obtained several advantages over the Carthaginians, and in a short time became formidable to that republic. It was not long, however, before the Romans, who were extending their views beyond the boundaries of Italy, formed a resolution of establishing themselves in Sicily; and this soon occasioned a rupture between them and the Carthaginians, which was followed by the first Punic war: and

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and with this commences the *third period* in the history of Carthage.

The *first Punic war* commenced in the year, B. C. 264, and it arose from the following circumstances. Some Campanian soldiers, who had belonged to the army of Agathocles, were kindly received at Messina, as they were leaving Sicily and embarking for their own country. But with an atrocious ingratitude and perfidy, they took occasion, in the night, either to expel or assassinate all the men; after which they married their wives, seized their effects, and remained sole masters of that important city. After they had divided the land and riches of the inhabitants among themselves, they called the city Mamertina, and assumed the name of Mamertini, that is, a martial or warlike people, from *Mamers*, a word which, in their language, signified *Mars*, the god of war. In imitation of their conduct, and by their assistance, a Roman legion treated in the same cruel manner the city of Rhegium, which lay directly opposite to Messina, on the other side of the strait. These two perfidious cities, concurring and mutually supporting each other, became formidable to their neighbours. Messina, in particular, being very powerful, gave great umbrage and uneasiness both to the Syracusans and Carthaginians, who possessed one part of Sicily. The Romans, after the departure of Pyrrhus, determined to punish the revoltors at Rhegium; and for this purpose they took the city, killed most of the inhabitants in the attack, and carried about 300, who survived, to Rome, where they were scourged, and publicly beheaded in the forum. By this sanguinary execution the Romans wished to testify to their allies their own innocence and integrity. Rhegium was then restored to its lawful possessors. The Mamertines were thus considerably weakened; and while they were concerting means for their own safety, they disagreed among themselves, so that one party surrendered the citadel to the Carthaginians, and the other called the Romans to their assistance and resolved to put them in possession of their city. Thus commenced the first Punic war. Although the Roman senate declined to take part with the Mamertines, who had acted a treacherous and cruel part; the people were less scrupulous, and determined to assist them. With this view the consul Appius Claudius crossed the strait with his army, and contrived to elude the vigilance of the Carthaginian general. The Carthaginians, partly by art and partly by force, were driven out of the citadel, and the city immediately surrendered to the consul. The Carthaginians, having executed their general, prepared to besiege the town with all their forces, which were also joined by those of Hiero. The consul, however, defeated them separately, and having raised the siege, laid waste the country. This was the first expedition, which the Romans made out of Italy. Hiero afterwards entered into an alliance with the Romans, which the Carthaginians were unable to prevent. The Carthaginians, thus deserted by their ally, determined to make every possible effort for driving the Romans out of Sicily; but these efforts were so far from being effectual, that they lost several towns, and particularly Agrigentum, which Hanno, commander in chief of all the Carthaginian forces, had made a place of arms, and his principal magazine. Notwithstanding these acquisitions, the Romans were well apprized, that as long as the Carthaginians retained the dominion of the sea, it would not be in their power to drive them out of Sicily; and, therefore, they now formed the first design of having a fleet, and of disputing with the Carthaginians the empire of the sea. At this time they had not a single vessel, which they could call their own; but though they were destitute of experience in maritime affairs, they applied to them with such ardour and

industry, that in two months they built 100 five-oared, and 20 three-oared galleys; and after some time spent in exercising the rowers, their fleet put to sea, under the command of the consul Duilius, and sailed in quest of the enemy. The Romans coming up with the Carthaginians near the coast of Myla, prepared for an engagement; and availing themselves of a grappling instrument, called *Corvus* or crow, they were able to board the enemies' ships and to come to a close fight. The Carthaginian fleet consisted of 130 sail, under the command of Hannibal. At first the Carthaginians despised their enemies; but when they saw the above-mentioned engines raised on the prow of every one of their ships, and found that they were thrown forcibly into their vessels so as to grapple them in spite of all resistance, they were not a little astonished. Being thus compelled to fight, as if they had been on land, they were unable to sustain the attack of the Roman vessels, which produced a great slaughter among the Carthaginians, and the loss of 80 vessels. This unexpected victory raised the spirits of the Romans; and extraordinary honours were conferred on Duilius, as the first Roman to whom a naval triumph was decreed. After several maritime conflicts, in which sometimes the Romans and sometimes the Carthaginians were victorious, the advantage upon the whole was on the side of the former. Determined, however, to combat the Carthaginians in their own country, they both prepared for a decisive engagement. The Roman fleet, consisting of 330 galleys, on board of which were about 140,000 men, was commanded by the consuls L. Manlius Vulso and C. Attilius Regulus, and rendezvoused at Messina; and the Carthaginian squadron, composed of 350 sail, and about 150,000 men, and commanded by Hanno and Hamilear, after assembling at Lilybæum, took their station at Heraclæa Minoa. The two fleets at length came within view of each other, and made the necessary dispositions for battle. The Roman squadron consisted of four divisions; the first of which was stationed on the right and the second on the left, and the third in the rear of the other two, so as to form a triangle, the vertex of which was composed of the two admiral galleys, in which were the consuls, placed in the front of their respective squadrons. The triarians, forming the 4th division, were drawn up in the rear of the whole fleet, parallel to the third division, the base of the fore-mentioned triangle, but extending beyond the two angles. The transports, with the horse and baggage on board, lay between the third division and the triarians, this being the situation in which they would be most secure from any attacks of the enemy. The Carthaginians, having perceived the disposition of the Roman squadron, immediately ranged their own in order of battle. They divided it into four smaller squadrons, which they drew up in one line. The three first divisions, posted to the right, stretched far into the sea, as if they intended to surround the Romans, pointing their prows directly upon them; the 4th lying to the left, kept close under shore, being disposed in the form of an outwork or tenaille. Hanno commanded on the right, and Hamilear on the left. In this action, which was conducted on both sides with great skill and valour, the Romans lost 24 galleys: but the Carthaginians, who were entirely defeated, had 30 sunk, and 63 taken by the victors. After this battle, which happened near Heraclæa Minoa, Hamilear made proposals of peace to the Romans, chiefly with a view of diverting them from the African expedition; but the Romans, rejecting the proposal, carried on the war; and the consuls, soon after sailing for Africa, with their whole fleet, and a powerful army on board, landed at Clypea without opposition. Regulus with the forces under his command committed great

ravages

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ravages along the sea-coasts, and even penetrated into the heart of the country. Having laid siege to Adis, or Adda, a fortress of great consequence to Carthage, the Carthaginians advanced to meet him; an encounter ensued, and the Carthaginians were defeated, with the loss of 17,000 men, and 18 elephants. Regulus, after this action, burnt all the open places, and, as Eutropius informs us, conquered 73 towns. Utica and Tunis were both obliged to submit, and nothing seemed now to remain but the siege of Carthage itself. To complete the misfortunes of the Carthaginians, the Numidians entered the territories of Carthage and committed such dreadful devastations, that a famine seemed to be inevitable. The African nations likewise, more immediately subject to Carthage, being weary of the Carthaginian yoke, joined the Romans. Regulus, well knowing the distressed situation of the Carthaginians, offered to negotiate a peace; but his terms were so humiliating, that the Carthaginians resolved to suffer any extremities rather than submit. Regulus and the Romans were become insufferably arrogant, in consequence of their success; and after having desolated the country, had advanced to the great morass, on which Carthage stood, resolving, upon the rejection of his proposals, to attack the capital of the African republic. At this moment of alarm and danger, Xantippus, a Lacedæmonian of great bravery and military skill, with a body of Greek mercenaries, arrived at Carthage. Having assumed the command of the Carthaginian forces, he taught them to form all the evolutions and movements of the military art, according to the Lacedæmonian manner. The Carthaginians, thus instructed and inspired, thought themselves invincible under the conduct of Xantippus, who drew them up in order of battle in a large plain before the city, and boldly advanced towards the Romans. After calling a council of war, in deference to the Carthaginian commanders, it was resolved to give the enemy battle on the following day. Regulus was become vain and self-confident, and by his misconduct occasioned the total ruin of his army. Xantippus availed himself of the error which he committed, and either put to the sword, or took prisoners, all, except 2000 men, who broke his right wing and made their escape to Clypea. Of the Carthaginians 800 were slain; and on the side of the Romans the number of those who fell in the battle and pursuit must have been about 13,000. Xantippus took Regulus himself, and 500 of his men, prisoners in the pursuit, and immediately carried them to Carthage, where all, except Regulus, were treated with great humanity. Regulus had in his prosperity so insulted the Carthaginians, that he is said to have been confined in a dungeon, with sustenance barely sufficient to keep him alive, and a huge elephant, at the sight of which animal he was always greatly terrified, was constantly placed near him. On this occasion the Carthaginian army did not consist of above 16,000 men, besides the elephants; and therefore, considering the number and valour of the Roman legions, this was a wonderful victory, and justly attributed to the conduct and bravery of Xantippus. This battle was fought in the year, B. C. 256. The Romans were not discouraged; but in the following campaign they put to sea with 360 vessels, and in an engagement with the Carthaginians, who met them with 203, proved victorious, took 114 ships and sailed to Africa in order to bring away the small remnant of the army of Regulus. The Romans afterwards sustained, by storms and other occurrences, such prodigious losses at sea, that they entertained thoughts of declining all preparations for the future against the Carthaginians, and to leave them masters of the ocean. However they were encouraged to

renew their attention to maritime operations by some subsequent events of a more favourable kind; and arriving in Sicily with a fleet of 200 ships, they formed the bold design of besieging Lilybæum, the strongest town possessed by the Carthaginians on that island, the loss of which would be attended with that of every part of it, and open to the Romans a free passage into Africa. In the prosecution of this siege the Romans encountered many losses and disasters, and were at length reduced to the necessity of turning the siege into a blockade, and of drawing a line round the place, to prevent the garrison from receiving any succours. The besieged, on the other hand, repaired their works and determined to defend the town to the last extremity.

In the year B. C. 249, the consul Claudius put to sea with a powerful fleet in order to surprise Drepanum; but he was vanquished by Adherbal, a Carthaginian admiral of great conduct and bravery. Claudius, with 30 vessels, escaped out of the engagement to the camp at Lilybæum, with intelligence of this defeat; [which was the greatest ever sustained by the Romans at sea since the commencement of this war. In the consulate of Lutatius Catulus and A. Posthumius, B. C. 242, the Romans equipped a fleet of 200 vessels, at the expence of private persons; and the command was given to Lutatius. As the Carthaginian fleet had retired to Africa, the consul seized all the advantageous posts in the neighbourhood of Lilybæum, and prepared for an engagement, which he knew to be inevitable, by exercising his soldiers and seamen at sea. As soon as he was informed that the Carthaginian fleet drew near, under the command of Hanno, he assembled all his best forces and sailed for the small island Egusa, which lay near Eryx, whither Hanno proposed to have repaired in order to obtain a supply for his army, and to reinforce his troops. The engagement commenced with great advantage on the side of the Romans, as their vessels were much better equipped and manned than those of the Carthaginians. They were, therefore, unable to sustain the first attack. Forty of their vessels were sunk, and seventy taken with their whole crews. The rest, favoured by a wind, which rose very seasonably for them, made the best of their way to Hieræ, the little island, opposite to Drepanum, from which they had sailed. There were upwards of 10,000 taken prisoners. Lutatius then advanced to the city of Eryx, where he engaged the Carthaginians, and cut off 2000 men. This last action concluded the operations of the first Punic war, in the year B. C. 241, after it had continued twenty-four years, and was followed by a peace, the terms of which were dictated by the victorious consul. The treaty, though it adjusts the interests both by sea and land of two powerful republics and their allies, is comprised in a small compass, and very clearly and accurately expressed. "There shall be peace between Rome and Carthage (in case the Roman people approve of it) on the following conditions: the Carthaginians shall evacuate entirely all Sicily; and shall no longer make war upon Hieræ, the Syracusans, or their allies; they shall restore to the Romans, without ransom, all the prisoners which they have taken from them; and pay them, within twenty years, 2200 Euboic talents of silver;" amounting to 515,000*l.* sterling. When these conditions were brought to Rome, the people, disapproving them, sent ten commissioners to Sicily, to terminate the affair. These made no alteration as to the substance of the treaty; but required that the time appointed for the payment of the sum demanded should be reduced to ten years; that 1000 additional talents should be paid immediately; and that the Carthaginians

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Carthaginians should depart out of all the islands, situate between Italy and Sicily.

Soon after the conclusion of the war waged by the Carthaginians against the Romans, they were under a necessity of commencing another with their mercenary troops, who had served under them in Sicily; which has been commonly called the African or Libyan war. It was principally occasioned by a neglect on the part of the Carthaginians in settling the arrears of their pay, or fulfilling the promises made to them by Hanno; and although it lasted only three years and four months, terminating in the year, B. C. 238, it was uncommonly barbarous and bloody. Hanno, who was employed to negotiate with them at Sica, whither they had been compelled to retire, imprudently proposed, that they should be content with receiving only a part of the arrears due to them, and remit the remainder on account of the pressing exigencies of the republic. This proposal was heard with dissatisfaction and murmur, which terminated in open rebellion. Accordingly about 20,000 of them marched towards Carthage, and encamped at Tunis, not far from that metropolis. No concessions now satisfied them; but the seeming condescension of the Carthaginians was ascribed to weakness and timidity. At length the settlement of this business was referred to some general of their own choice; and as they selected Gisco, for whom they professed great respect, he was employed to mediate between the contending parties. This general addressed them in mild and soothing language; recalled to their memories the long time they had been in the Carthaginian service, as well as the considerable sums they had received from the republic; and granted almost all their demands. When the treaty was almost concluded, two mutineers occasioned a tumult in every part of the camp. These were appointed chiefs of the furious multitude; Gisco's tent was plundered of the money designed for the payment of the forces; and the general himself, with his attendants, were dragged to prison and treated with great indignity. All the cities of Africa, which they had solicited to join them in the recovery of their liberty, united with them; except Utica and Hippacra, which they besieged. Carthage had never been before this time in circumstances so distressed and perilous. Every thing seemed to conspire to its ruin. The citizens drew their subsistence from the rents or revenues of their lands, and the public expences from the tribute paid from Africa; of which they were not only deprived at once, but it was employed against them. They were also destitute of arms and forces either for sea or land; they had made no preparations for sustaining a siege, or equipping a fleet; and, to complete their misfortunes, they had not the least prospect of receiving assistance from any foreign friend or ally. At the same time they had reason to reproach themselves for numerous instances of oppression and cruelty in their conduct towards the African nations. The Africans were therefore easily prevailed upon to engage in this rebellion; and the women, whose husbands and fathers had been dragged to prison for non-payment of heavy tributes, were more exasperated than the men, and were eager to deliver up all their ornaments towards the expences of the war. The Carthaginians, however, though deeply distressed, did not despond; but exerted themselves in levying troops and fitting out ships, the command of which was intrusted with Hanno. The army of the rebels had increased to 70,000 men, and whilst they were besieging the two cities already mentioned, their camp was pitched at Tunis, and Carthage was held in a kind of blockade. Hanno's first object was the relief of Utica; but on account of several errors with which he was charge-

able in the conduct of this business, he was superseded by Hamilcar Barcas. Hamilcar having obliged the rebels to raise the siege of Utica, marched against their main army, defeated part of it, and seized almost all their advantageous posts. Being afterwards joined by a young Numidian nobleman, named Naravasus, with 2000 of his countrymen, he fell upon the rebels, killed 10,000 of them, and took 4000 prisoners. Those who survived were treated with singular lenity. Spondius, the chief of the rebels, with a view of counteracting this clemency and preventing a desertion among his troops, engaged them in a service which would deprive them of all hopes of being reunited to the enemy; and this was no other than the murder of Gisco, and about 700 of his comrades, who had been confined with him in prison. The rebels also resolved to treat all such Carthaginians, who should fall into their hands, in the same barbarous manner. Several circumstances occurred at this time that served to dispirit the Carthaginians; one of which was the revolt of Utica and Hippacra, the only cities which had uniformly preserved their allegiance, and always adhered inviolably to the republic, even when Agathocles and the Romans had made their descents in Africa. A division also took place among their generals, and Hannibal was deputed to supersede Hanno. After Hannibal's arrival in the camp, the affairs of the Carthaginians took a favourable turn; Hiero, king of Syracuse, afforded them assistance; and in a battle with the rebels, distressed by famine, and deprived of their chiefs who had been seized, 40,000 of them were cut to pieces. The consequence of this victory was the reduction of almost all the cities of Africa, which immediately returned to their allegiance. Hamilcar, without loss of time, marched against Tunis, which, ever since the beginning of the war, had been the asylum of the rebels and their place of arms; and Hannibal joined him in besieging it. In order to strike terror into the enemy, crosses were set up near the walls, and Spondius was hung on one of them, and his companions who had been taken with him, on the rest, and thus they all expired. Matho, the other chief of the rebels, who commanded in the city, saw what he had to expect, and became desperate in his own defence. Perceiving Hannibal off his guard, through confidence of success, he made a sally, attacked his quarters, killed many of his men, took several prisoners, among whom was Hannibal himself, and plundered his camp. He then placed Hannibal on the cross, in the room of Spondius, after having first made him to endure inexpressible torments, and sacrificed around the body of Spondius, thirty citizens of the first quality in Carthage, as so many victims of his vengeance. When the news of this event reached Carthage, it caused great consternation, and it was thought advisable to make one grand effort. Accordingly, all the young persons capable of bearing arms were pressed into the service. Hanno was sent to join Hamilcar; and thirty senators were deputed to conjure those generals to forget past quarrels, and to sacrifice their resentments to their country's welfare. Their interposition was effectual; the generals were reconciled; and from this time the Carthaginians were successful in all the measures which they adopted. Hanno was eager to hazard a battle; and when an engagement took place, victory did not long remain doubtful. The rebels gave way, the Africans were almost all slain, and the rest surrendered. Matho was taken alive, and carried to Carthage, where he and his soldiers, after having adorned the public triumph, were led to execution, and finished, by a painful and ignominious death, a life that had been polluted with the blackest treasons, and unparalleled barbarities. From the excesses of cruelty committed

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in it, Polybius informs us, that this war was generally distinguished among the Greeks by the name of the "Inexpiable war." During the Libyan war, the mercenaries in Sardinia declared against the Carthaginians, excited by the example of Matho and Spondius in Africa. They seized upon the person of Bosar, who commanded in the citadel of Olbia, and massacred both him and the Carthaginian garrison. The senate, apprised of this revolt, sent Hanno, with a strong reinforcement of troops, to bring the mutineers to reason; but Hanno, on his arrival, was abandoned by his men who joined the mercenaries, and not only crucified their leader, but put to the sword all the Carthaginians, whom they could find in the island. They then besieged all the cities one after another, and soon gained possession of the whole country. Feuds, however, arising between them and the natives, the mercenaries were driven entirely out of the island, and took sanctuary in Italy. Thus the Carthaginians lost Sardinia, which was to them an island of great importance, an account of its extent, its fertility, and the great number of its inhabitants. The Sardinian war began in the year 234 B. C. and continued three years.

The Romans ever since their treaty with the Carthaginians, had behaved towards them with great justice and moderation; and yet, notwithstanding their professions of friendship, they countenanced and protected the fugitive mercenaries. They sent the consul Sempronius, on trivial pretences, with a fleet, to reinstate the malcontents, and take possession of Sardinia, which the Carthaginians were obliged to cede. They also obliged the Carthaginians to defray the expence of their armament, and, besides, extorted from them the sum of 1200 talents. Such perfidious conduct could not fail of heightening the aversion Hamilcar had already conceived, and did not a little contribute to the second Punic war, and to those dreadful devastations which Hannibal afterwards committed in Italy.

Hamilcar, by the happy conclusion of the Libyan war, not only restored tranquillity to the republic, but greatly extended the conquests of the Carthaginians in Africa. But as his country was not in a condition to commence an immediate war with Rome, he determined, by a new plan of operations, to place it upon a level with the imperious republic; and with this view to make an entire conquest of Spain, that the Carthaginians might have troops capable of opposing the Romans. For this purpose Hamilcar inspired both his son-in-law Asdrubal and his son Hannibal with an implacable aversion to the Romans, as the inveterate enemies both of his grandeur and that of his country. Immediately after the troubles in Africa were appeased, the senate sent Hamilcar on an expedition against the Numidians, in which he conducted himself with such a degree of skill and valour, and also with such success, that he was vested with the command of the army destined against Spain. His son Hannibal, although at this time only nine years of age, importuned his father for permission to accompany him on this occasion; and Hamilcar having granted his request, previously ordered him to put his hand on the altar, and to swear, that he would be an irreconcilable enemy to the Romans, and act as such when his age allowed. He likewise took with him Asdrubal, after he had bestowed his daughter in marriage upon that general.

As soon as the military preparations were completed, Hamilcar advanced with a powerful army to Abyla, and crossing the straits of Hercules, landed in Spain without opposition. He commanded in this country during nine years, in that interval subdued many warlike nations, and acquired an immense treasure, which he wisely distributed, partly among his troops, and partly among the great men at

Carthage; thus securing his interest with both these powerful bodies. At length, in a battle with the Vettones, or Vectones, a nation of Lusitania, he fell on the field, and died gloriously, as Polybius says, at the head of his troops, in the year B. C. 228. Upon Hamilcar's death, the army elected his son-in-law Asdrubal, then the Carthaginian admiral, to succeed him in the command. The choice was confirmed by the senate; and it was amply justified by his subsequent conduct, though Hanno and his adherents affected to depreciate his merit. He built, or at least fortified, New Carthage. See CARTHAGENA. The Romans, alarmed by the great progress which Asdrubal was making in Spain, prevailed upon him, partly by menaces, and partly by persuasion, to conclude a new treaty with them, importing, that the Carthaginians should not pass the Iberus, and that Saguntum, a colony of Zacynthians, and a city between the Iberus, and that part of Spain, subject to the Carthaginians, as well as the other Greek colonies, should enjoy their ancient rights and privileges. Asdrubal did not pass beyond the limits stipulated by the treaty, though he still pushed on his conquests, and subdued all that part of Spain extending from the western ocean to the Iberus, within five days' journey of the Pyrenées. His engaging address and affable deportment made him popular among the Reguli of Spain, and brought them over to the interest of Carthage. Having governed the Carthaginian dominions in Spain eight years, he was treacherously murdered by a Gaul, whose master he had put to death, B. C. 220. Three years before his death, Asdrubal had written to Carthage, requesting that Hannibal, who was then in the 24th year of his age, might be sent to him; and on his first arrival in the camp, he manifested indications of extraordinary courage and greatness of mind, and interested the attachment of the whole army. Under Asdrubal he made three campaigns, and was always employed in enterprises of the greatest importance; and after his death, the army immediately saluted him general. At this time (viz. 220, B. C.) he was in the twenty-seventh year of his age, admitting (See Blair's tables) that he was born in the year 247 B. C. The senate, as well as the people of Carthage, confirmed this election, although Hanno and his faction were secretly averse from his promotion. As soon as he assumed the command, he commenced a plan of operations, which all the officers approved. He began his career with marching against the Olcades, who were seated near the Iberus, and having reduced Althæa, their capital, their other towns immediately submitted. With the opening of the next campaign he subdued the Vaccæi, and prepared to meet an army of 100,000 men, collected by the Carpetani, one of the most powerful nations in Spain, who had been induced to declare war against the Carthaginians. Having routed this formidable army, he desolated the whole country of the Carpetani, who thought proper to submit to the conqueror. His next object was the siege of Saguntum, and as the inhabitants had applied to the Romans for assistance, he made a vigorous effort for reducing the place before they could take any step towards its relief. The progress of this siege was retarded by the valiant resistance of the Saguntines, who, by their repeated sallies, destroyed many of the besiegers; though they were hardly sensible of their loss, as Hannibal's army consisted of 150,000 foot, and 20,000 horse. The fate of the city, however, was for some time repited, by a wound which Hannibal received as he was reconnoitring some of the works. As soon as he recovered, hostilities recommenced, after a short cessation, with double fury; but the Saguntines, irritated by despair, at length forced the Carthaginians not only to abandon the

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breach they had made in the wall of the city, but to take refuge in their camp. After this repulse, Hannibal remained for some days in a state of inaction; but having inspired his troops with courage and promised them great rewards from the plunder of the place, they made a vigorous attack, whilst he placed himself on the top of a tower, which overlooked the works of the besieged and the whole city. At last the Saguntines, having defended themselves with an almost invincible valour and obstinacy, found themselves reduced by want of provisions to the greatest extremities, and to increase their distress, the Romans seemed to have entirely deserted them. In this state of despair, the senators brought all their gold, silver, and precious effects into the market place, and causing a great fire to be kindled threw their treasure and themselves into the flame. At this time a tower, which had been battered by Hannibal's rams, falling with a dreadful crash, the Carthaginians entered the town by the breach, soon made themselves masters of it and the citadel, and cut to pieces all the inhabitants who were able to bear arms. The reduction of Saguntum, after a siege of eight months, took place in the year B. C. 219.

The capture of Saguntum has by some been represented as the cause of the *second Punic war*, which commenced in the year B. C. 218. But Polybius affirms this to have been a very mistaken notion. The regret of the Carthaginians, for their having so tamely given up Sicily, by the treaty which terminated the first Punic war; the injustice and violence of the Romans, who took advantage from the troubles excited in Africa, to dispossess the Carthaginians in Sardinia, and to impose a new tribute on them; and the success and conquests of the latter in Spain, were the true causes of the violation of the treaty, as Livy (agreeing with Polybius) insinuates, in few words, in the beginning of his history of the second Punic war.

When the news of the reduction of Saguntum arrived at Rome, it occasioned inexpressible grief and consternation. As soon as the Romans were able to restrain or suppress the first emotions occasioned by this humiliating and distressing intelligence, an assembly of the people was convened, and war against the Carthaginians was unanimously decreed. That no ceremony might be wanting, deputies were sent to Carthage, to inquire whether Saguntum had been besieged by order of the republic, and if so, to declare war; or in case this siege had been undertaken solely by the authority of Hannibal, to require that he should be delivered up to the Romans. The deputies perceiving that the senate gave no direct answer to their demands, one of them taking up the folded lapet of his robe, "I bring here," says he in a haughty tone, "either peace or war; the choice is left to yourselves." The senate answering that they left the choice to him: "I give you war then," says he, unfolding his robe. "And we," replied the Carthaginians, with the same haughtiness, "as heartily accept it, and are resolved to prosecute it with the same cheerfulness."

When war was resolved upon and proclaimed on both sides, Hannibal, who, after the reduction of Saguntum, had put his troops into winter-quarters at New Carthage, and who remained during the winter in a state of inaction, made several wise regulations for the security of the Carthaginian dominions in Spain and Africa. With this view he marched the forces out of the one into the other, so that the Africans served in Spain and the Spaniards in Africa. The command of the Spanish forces was entrusted by Hannibal with his brother Asdrubal, with a fleet of about 60 ships to guard the coasts; and he also gave him the wisest counsel for the direction of his conduct. Before Hannibal

himself set out for his expedition, he went to Gades or, Cadiz to discharge the vows which he had made to Hercules, and to engage himself by new vows, in order to obtain success in the war upon which he was entering.

Having made every necessary preparation for his march, he left his winter-quarters at New Carthage early in the spring, with an army consisting of above 100,000 men, of whom 12,000 were horse, and about 40 elephants. Here he is said to have been encouraged by dreams and omens to prosecute his enterprise. He passed the Iberus without obstruction, and soon subdued the several nations which opposed him in his march, though he lost a considerable part of his army in this expedition. Before he proceeded further, he committed the command of the country between the Iberus and the Pyrenean hills to Hanno, and 11,000 men. He dismissed the like number, sending them back to their respective countries, and assuring those who remained that they should be allowed to return whenever they desired it. He then crossed the Pyrenean hills, and advanced at the head of 50,000 foot and 9000 horse as far as the banks of the Rhone. The passage of the Rhone was disputed by the Gauls, who had assembled with all their forces for this purpose. Having succeeded in this arduous and difficult enterprise, he continued his march, crossing through the middle of Gaul, and moving northwards, in order to avoid Scipio, and to favour his design of marching all his forces, without diminution by any engagement which he could escape, into Italy. During his progress through the country of the Allobroges, he was chosen umpire between two brothers, who disputed their right to the kingdom. Brancus, the elder brother, having been reinstated by Hannibal in his dominions, furnished his whole army with provisions, clothes, and arms; and escorted him through the countries of the Tricallini, Vocontii, and Tricorii, as far as the river Druentia, now the Durance; and from thence he reached the foot of the Alps without opposition. In the prosecution of his march to the summit of the Alps he encountered many difficulties. The sight of these mountains, which seemed to touch the skies, covered with snow, and exhibiting scarce any thing to the eye but a few tottering cottages scattered on the sharp tops of inaccessible rocks, not a little intimidated his troops. The meagre flocks almost perished with cold, and hairy savages, with fierce aspects, renewed also the terror which the distant prospect of this ridge of mountains had raised, and struck a prodigious damp on the hearts of the soldiery. Besides, the whole army was brought upon the verge of destruction by the perfidy of a Gallic nation; whose deputies, under the specious appearance of friends, persuaded Hannibal to commit himself to their conduct. But these faithless guides led him into a steep pass, out of which they thought it would be impossible for him to make his escape. However, Hannibal, by the wise disposition of his forces, as well as the assistance of his elephants, and bravery of his infantry, who greatly distinguished themselves on this occasion, at last dispersed the enemy. After which adventure he surmounted all other difficulties, and the ninth day from his beginning the ascent, arrived at the top of the mountains. It must be observed, that Hannibal was in a great measure obliged to the elephants for his escaping all the disasters the enemy threatened him with; for wherever these huge animals appeared, the Gauls were struck with such terror, that they immediately fled with precipitation, leaving the road clear for the Carthaginian general.

Hannibal halted two days on the summit of the Alps, to refresh his wearied troops, which were greatly dispirited by the snow that had lately fallen. In order to animate them

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to make another effort with alacrity, from one of the highest hills he gave them a prospect of the fruitful plains watered by the Po, the day before he decamped. He likewise pointed towards the place where Rome stood; which, he assured them, a battle or two would make them masters of, and consequently put a glorious period to all their toils. This prospect inspired them with such vigour, that they seemed to have forgot all the fatigues they had undergone, and to think only of taking possession of that haughty city, whose conduct towards their state had been nothing but one continued series of insults since the conclusion of the Sicilian war.

They therefore pursued their march; but the difficulty and danger increased, in proportion as they approached nearer the end of the descent. We are told, that about this time Hannibal meditated a retreat; but from the genius of that general, as well as the whole tenour of his conduct, this conjecture seems highly improbable. To omit many particulars, they came at last to a path naturally very steep and craggy; which being rendered impracticable by the late falling of the earth, terminated in a frightful precipice above a thousand feet deep. In short, Hannibal found it would be impossible to accomplish his design, without cutting a way in the rock itself, through which his men, horses, and elephants might pass; and this, with immense labour, he effected. Approaching, therefore, gradually the Insubrian foot of the Alps, he detached some parties of his horse to forage, there appearing now some spots of pasture where the ground was not covered with snow. Livy informs us, that in order to open and enlarge the path, large trees were felled, and piled round the rock, after which fire was set to them. The wind, by good fortune, blowing hard, a fierce flame soon broke out; so that the rock glowed like the very coals with which it was surrounded. Then Hannibal, according to the same author, caused a great quantity of vinegar to be poured on the rock; which piercing into the veins, that were now cracked with the intense heat of the fire, calcined and softened it. In this manner, taking a large compass, in order that the descent might be easier, he cut a way along the rock, which opened a free passage to the forces, baggage, and elephants. As Polybius has passed over in silence the use Hannibal made of vinegar on this occasion, many reject that incident as fabulous.

At length Hannibal gained the fruitful plains of Insubria, where, in reviewing his army he found, that in five months and a half's march (for so long was it since he had left New Carthage), he had lost by sickness, desertion, fatigue, and various engagements, thirty thousand foot, and three thousand horse. His army now amounted to no more than twenty-six thousand effective men. Above twenty thousand had perished since his departure from the Rhodanus. That we may have a more distinct idea of Hannibal's march, it will be proper to give the names and distances of some of the principal places through which that general passed in his way to Italy, transcribed from Polybius. From New Carthage to the Iberus were computed two thousand six hundred stadia; from the Iberus to Emporium, a small maritime town, which separated Spain from the Gauls, according to Strabo, sixteen hundred stadia; from Emporium to the banks of the Rhodanus, sixteen hundred stadia; from the Rhodanus to the Alps, fourteen hundred stadia; from the Alps to the plains of Insubria, twelve hundred stadia. In all eight thousand four hundred stadia, making much about a thousand English miles.

Upon Hannibal's arrival in Italy he refreshed his troops, and then marched against the Taurini, who had refused to

enter into an alliance with him; and having encamped before Taurinum (Turin) their chief city, he carried it in three days, and put all who had opposed him to the sword. This expedition so terrified the neighbouring Gauls, that they surrendered at discretion. The rest of the Gauls would probably have followed their example, if they had not been awed by the terror of the Roman arms, which were now approaching. Hannibal therefore, as he had no time to lose, thought it the wisest course which he could pursue to march directly into their country, and to make such an attempt as would induce those who had an inclination to join him to put themselves under his protection. Rome was greatly alarmed by the rapid progress of Hannibal, and Sempronius was ordered to leave Sicily, and hasten to the relief of his country; whilst Scipio, the other consul, advanced with the utmost diligence towards the enemy, crossed the Po, and pitched his camp near the Ticinus, now the Tesino in Lombardy. Here the Roman and Carthaginian armies came in sight of each other; and the generals on each side prepared for battle by haranguing their respective soldiers. The contest continued for a long time with equal success, and many fell on both sides. At length the Roman troops were put into disorder by the Numidians, who attacked them in the rear, and especially by a wound which the consul received, and by which he was disabled. However, he retreated in good order, and was conveyed to his camp by a body of horse, who covered him with their arms and bodies. He hastened to the Po, which he crossed with his army, and then broke down the bridge, so that he prevented Hannibal from overtaking him. For this first victory Hannibal was indebted to his cavalry; and it was hence inferred that the strength of his army consisted in his horse, and that on this account it would be proper for the Romans to avoid large open plains, like those between the Po and the Alps. The battle of Ticinus was followed by that of Trebia, a small river of Lombardy which falls into the Po a little above Placentia, where Sempronius, who had arrived from Sicily, joined his forces to those of Scipio. Having gained an inconsiderable advantage over a party of Carthaginians, and finding himself at the head of 16,000 Romans and 20,000 allies, exclusive of cavalry, he determined, against the more prudent counsel of his colleague, to make immediate preparation for battle. On this occasion the Carthaginians gained a complete victory, with a very inconsiderable loss. Hannibal availed himself of the opportunity which winter-quarters afforded him for refreshing his troops, and gaining the affections of the natives. For this purpose, after having declared to the prisoners he had taken from the Roman allies, that he was not come with the view of making war upon them, but to restore the Italians to their liberty, and protect them against the Romans, he sent them all home to their respective countries, without requiring any ransom. As soon as the winter was past, he set out towards Tuscany; but in his march over the Apennines he was overtaken with a dreadful storm, which destroyed great numbers of his men. He therefore marched back to Placentia, where he again engaged with Sempronius; the loss in the contest on both sides being nearly equal. Hannibal, having received information that C. Flaminius, one of the new consuls, had advanced as far as Arretium, a town of Tuscany, resolved to march thither and engage him as soon as possible. Accordingly, after having encountered incredible hardships in his way, he pitched his camp between Arretium and Fesulæ, in the richest and most fruitful part of Tuscany. Concluding from the character of Flaminius, who was arrogant, bold, and enterprising, that he should soon be able to bring him to a

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battle, Hannibal lost no opportunity of inflaming his impetuous spirit, and of accelerating the action in which he wished to engage. He therefore laid waste with fire and the sword the country through which he passed, and advanced in his progress towards Rome. Having gained an eminence, at the termination of a narrow defile formed by the mountains of Cortona and the lake Trasymene, and being pursued by the Roman consul, he prepared for battle; and the event was the total defeat of the consular army. Flaminius himself with 15,000 men were left dead on the field, and about 10,000 escaped to Rome by different roads. Hannibal lost only 1500 men, most of whom were Gauls; though great numbers both of his soldiers and of the Romans died afterwards of their wounds. Having made diligent but ineffectual search for the body of Flaminius, for the purpose of giving it an honourable burial, he put his troops into quarters of refreshment, and solemnized the funerals of 30 of his chief officers, who had been slain in the action. This battle was fought in the year B.C. 217. Hannibal, not thinking it proper to advance directly to Rome, pursued his route through Umbria and Picenum; and after ten days' march arrived in the territory of Adria. As he plundered the country through which he passed, he was loaded with booty. Having attacked Spoletum, and being repulsed with loss, he proceeded to the frontiers of Apulia, and ravaged the adjacent territories. Polybius informs us, that Hannibal treated the allies of the Romans with the utmost cruelty in this expedition. At this time Fabius, followed by Minucius and four legions, had marched from Rome in quest of the enemy; but with a firm resolution not to let him take the least advantage, nor to advance one step till he had first reconnoitered every place; nor hazard a battle, till he should be sure of success. Hannibal made various attempts to provoke Fabius to a battle, but they were all ineffectual. The dictator, notwithstanding all the artifices, the marches, counter-marches, and feints, of the Carthaginian general, inflexibly adhered to his first resolution, and gave his crafty enemy to understand, that the Romans, instructed by their defeats, had at last made choice of a general capable of opposing Hannibal. Resolved on leaving Campania with his immense spoils, Hannibal marched with his army towards the confines of Samnium; but was much incommoded in his progress by the prudent dispositions and movements of Fabius. Having encamped at the foot of the mountains, he found himself involved in great difficulties, as the Romans had seized upon Casilinum and Calliula, and pent up his army in such a manner, that it seemed impossible for him to escape. Whilst Fabius was preparing for an attack, the inventive genius of Hannibal contrived a stratagem, by which he eluded the efforts of the Roman dictator, and preserved both himself and his army, when they were upon the very brink of destruction. He afterwards returned to Apulia, and having taken the town of Gerninum by assault, made this the place of his encampment. In the mean time, Fabius, being ordered to Rome, left the command of the army to Minucius, his general of horse, with orders to observe the motions of Hannibal at a proper distance; but by no means to engage him. The sequel is related under the article *CANNÆ*, where the Carthaginian general obtained a complete victory over the Romans. See also *CAPUA*.

Whilst Hannibal was pursuing his conquests in Italy, the Carthaginian affairs in Spain, in consequence of the defeat of Asdrubal by Scipio, began to wear an unpromising aspect. Scipio, improving his naval victory, took Honosca by storm, and levelled it with the ground. From thence he proceeded to New Carthage; laid waste the adjacent territory, and set fire to the suburbs of that city. He also obtained several

other advantages in the island Ebusus, now Yvica, and in other places; and concluded a treaty with the inhabitants of the Balearic islands. After these exploits Livy says, that 20 different cantons of Spaniards submitted to the Romans; and Asdrubal was compelled to retire into Lusitania, and those parts of Spain, that border upon the ocean. The Carthaginian commander was also reduced to great difficulties by the irruption of the Celtiberian princes, under the order of Scipio, into the Carthaginian territories; by their capture of three fortresses; and by two defeats, in which 15,000 men belonging to Asdrubal's army were killed, and 4000 taken prisoners. The two Scipios in this campaign passed the Iberus, and penetrated into the Carthaginian dominions, as far as Saguntum. Whilst their arms were making considerable progress in Spain, Asdrubal received orders from Carthage to march into Italy for the relief of his brother; but the two Roman generals resolved to prevent, if possible, his leaving Spain. They therefore forced him to fight, and defeated him, so that he could neither continue his march for Italy, nor remain with any safety in Spain. In Sardinia the Carthaginians were no less unsuccessful; for, in a battle fought against the Romans, they lost 12,000 men, and a greater number of prisoners, among whom were Asdrubal, surnamed Calvus, Hanno, and Mago, who were distinguished by their birth as well as military exploits. Afterwards the face of affairs was very much changed in Spain. The two Scipios were defeated and killed, and the Roman territories in that country seemed to be inevitably lost. They were preserved, however, by the valour of L. Marcus, a private officer of the Equestrian order; and shortly after, the younger Scipio was sent thither, who revenged the death of his father and uncle, and restored the affairs of the Romans in Spain to their former flourishing condition.

From the period of Hannibal's abode at Capua, the Carthaginian affairs in Italy no longer supported their reputation. M. Marcellus, first as prætor and afterwards as consul, contributed very much to this revolution. He harassed Hannibal's army on every occasion, seized upon his quarters, forced him to raise sieges, and even defeated him in several engagements; so that he was called the sword of Rome, as Fabius had before been named its buckler. But what most affected the Carthaginian general, was to see Capua besieged by the Romans. In order to preserve his reputation among his allies, he flew to its relief, attacked the Romans, and fought several battles in order to oblige them to raise the siege. But all his measures for this purpose being defeated, he marched hastily towards Rome, that he might thus make a powerful diversion. Rome was at first much alarmed; and one of the senators proposed to recall all the armies to succour the capital. Fabius, however, declared, that it would be shameful in them to be terrified, and forced to change their measures upon every motion of Hannibal. They, therefore, contented themselves with recalling only part of their army; and whilst Hannibal and the Roman consul, having drawn up their respective armies before the city, were preparing for a decisive battle, of which Rome was to be the recompence, a violent storm obliged them to separate. When they again repeatedly rallied, the same impediment to action occurred; so that Hannibal, believing something supernatural in the event, said, according to Livy, that sometimes his own will, and sometimes fortune, would not suffer him to take Rome. At length he retired, and in his march plundered the rich temple of the goddess Feronia. The success of the Romans in the siege of Capua gave them a visible superiority over the Carthaginians; and displayed, at the same time, how formidable

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able the power of the Romans was, when they undertook to punish their perfidious allies; and the feeble protection which Hannibal could afford his friends, at a time when they most wanted it. It remains that we mention one unforeseen defeat that ruined all the measures, and blasted all the hopes of Hannibal with regard to Italy. The consuls of the 11th year of the second Punic war (B. C. 207.) were C. Claudius Nero, and M. Livius. The province of the latter was the Cisalpine Gaul, where he was to oppose Asdrubal, who, according to report, was preparing to pass the Alps. The former commanded in the country of the Brutians, and in Lucania, that is, in the opposite extremity of Italy, and was there making head against Hannibal. The passage of the Alps gave Asdrubal very little trouble: the way having been previously cleared by his brother, and all nations being disposed to receive him. Some time after this he dispatched couriers to Hannibal, who were intercepted; and by their letters Nero found, that Asdrubal was hastening to join his brother in Umbria. In order to disconcert and defeat this plan, Nero set out with a detachment of his army consisting of 7000 men, and marching with extraordinary diligence, joined the other consul in the night. When Asdrubal discovered, by reconnoitering the enemy's army, that fresh troops were arrived, he concluded that they belonged to the other consul, and was thus led to conjecture, that his brother had sustained a considerable loss, and also to fear, that he was come too late for his assistance. He therefore founded a retreat, and his army began to march in great disorder. Whilst he was preparing to cross the river Metaurus, the army of the enemy came up with him, and in this extremity it was impossible to avoid an engagement. The battle that ensued was long and obstinate; and Asdrubal distinguished himself by his self-possession and valour. At length, when victory declared for the Romans, being unable to survive the loss of so many thousand men, who had quitted their country to follow his fortune, he rushed at once into the middle of a Roman cohort, and there died in a manner worthy of the son of Hamilcar, and brother of Hannibal. This was the most bloody battle which the Carthaginians had fought during this war; and whether we consider the death of the general, or the slaughter made of the Carthaginian forces, it may be looked upon as a reprisal for the battle of Cannæ. The Carthaginians lost 55,000 men, and 6000 were taken prisoners. The Romans lost 8000. These were so weary of killing, that some person telling Livius, that he might very easily cut to pieces a body of the enemy who were flying; "It is fit," says he, "that some should survive, in order that they may carry the news of this defeat to the Carthaginians." Asdrubal's head being thrown into the camp of the Carthaginians, informed Hannibal of his brother's fate. Hannibal perceived by this cruel stroke the fortune of Carthage; "It is done," says he, "I will no longer send triumphant messages to Carthage. In losing Asdrubal, I have lost at once all my hope, all my good fortune." He afterwards retired to the extremity of the country of the Brutians, where he assembled all his forces, who found it a very difficult matter to subsist there, as no provisions were sent them from Carthage. The fate of arms was not more propitious to the Carthaginians of Spain. The three Carthaginian generals in that country, Asdrubal, son of Gisco, Hanno, and Mago, having been defeated with their numerous armies, by the Romans, in several engagements, Scipio the younger at last possessed himself of Spain, and subjected it entirely to the Roman power. Upon his return to Rome, he was declared consul, at the age of 30 years, and Sicily was allotted to him. He set out with all imaginable expedition for this province;

whilst his colleague in the consulate, P. Licinius Crassus, was to command in the country to which Hannibal had retired. Soon after Scipio crossed over to Africa, and made this country the seat of war. The devastation of the country; the siege of Utica; the entire defeat of the two armies under Syphax and Asdrubal, whose camp was burnt by Scipio; and afterwards the capture of Syphax himself, in whom the Carthaginians reposed their chief confidence;—all these things forced them at last to turn their thoughts to peace. Accordingly, they deputed 30 of their principal senators, selected out of the powerful body at Carthage, called the "Council of the Hundred," to wait on the Roman general in his tent; who accused Hannibal as the author of all their calamities, and promised, in the name of the senate, an implicit obedience to whatever the Romans should please to ordain. Scipio replied, that he would grant them a peace, upon condition that they should deliver up all the prisoners and deserters to the Romans; that they should recal their armies out of Italy and Gaul; should never again set foot in Spain; should retire out of all the islands between Italy and Africa; should deliver up all their ships, 20 excepted, to the victor; should give to the Romans 500,000 bushels of wheat, 300,000 of barley, and pay 15,000 talents:—and that, in case they were pleased with these conditions, they then might send ambassadors to the senate. The Carthaginians feigned compliance, in order to gain time till Hannibal returned. A truce was then granted to the Carthaginians, who immediately sent deputies to Rome, and at the same time an express to Hannibal to order his return into Africa. Hannibal received the orders from Carthage with inexpressible concern; and he returned home, turning his eyes wishfully to Italy, accusing gods and men of his misfortunes, and calling down a thousand curses, as Livy says, upon himself for not having marched his soldiers directly to Rome after the battle of Cannæ, whilst they were still reeking with the blood of its citizens. The decision of the whole matter was referred by the Roman senate to Scipio, who, being upon the spot, could best judge what conditions were most suitable to the welfare of the state. About this time a Roman fleet of about 200 vessels of burthen was dispersed near Carthage by a storm; and Asdrubal sailed out of the harbour, by order of the senate, seized the greatest part of them, and brought them to Carthage, though the truce was still subsisting. This act of aggression was complained of by Scipio; but his remonstrances were little regarded by the Carthaginians. Hannibal's approach had revived their courage, and inspired them with very flattering hopes. This circumstance afforded a new occasion of war between the two nations. Hannibal, now desirous of peace more than a renewal of the war, flattered himself that the conditions of it would be more honourable, as he was at the head of an army, and as the fate of arms might still appear uncertain. He therefore solicited an interview with Scipio, which was agreed to at a time and place that were fixed. This interview proving ineffectual, the generals left one another with a resolution to decide the fate of Carthage by a general battle, fought on the plains of Zama, about five days' march from Carthage, in the year B. C. 202. The Carthaginians, after a very obstinate fight, were obliged to fly, leaving 20,000 men on the field of battle, and the like number of prisoners were taken by the Romans. Hannibal escaped in the tumult, and entering Carthage, owned that he was irrecoverably defeated, and that the citizens had no alternative left, but the acceptance of peace on any conditions. Thirty deputies waited upon the conqueror at Tunis, and sued for peace on the most submissive terms. Scipio called a council, the majority of which were for raising

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raising Carthage and treating the inhabitants with the utmost severity. But the consideration of the time which it would require before a city so strongly fortified could be taken, and Scipio's fear lest a successor might be appointed to him whilst he should be employed in the siege, made him incline to clemency. Accordingly a peace, terminating the second Punic war, was concluded between the Carthaginians and Romans, upon the following conditions dictated by Scipio:—"that the Carthaginians should continue free and preserve their laws, their territories, and the cities they possessed in Africa before the war:—that they should deliver up to the Romans all deserters, slaves, and captives belonging to them; all their ships, except 10 triremes; all their tame elephants, and that they should not train up any more for war:—that they should not make war out of Africa, nor even in that country, without first obtaining leave for that purpose from the Roman people:—that they should restore to Masinissa all they had dispossessed either him or his ancestors of:—that they should furnish money and corn to the Roman auxiliaries, till their ambassadors should be returned from Rome:—that they should pay to the Romans 10,000 Euboic talents of silver, (1,750,000*l.*) in 50 annual payments; and give 100 hostages, who should be nominated by Scipio:—and in order that they might have time to send to Rome, it was agreed to grant them a truce, upon condition that they should restore the ships taken during the former war, without which they were not to expect either a truce or peace." Soon after the treaty of peace with the Romans, an article in this treaty involved the Carthaginians in a dispute with Masinissa. This article required them to restore to Masinissa all the territories and cities which he possessed before the war; and, moreover, Scipio, in recompence of the zeal and fidelity which that monarch had shewn with regard to the Romans, had added his dominions to those of Syphax. From this circumstance originated the contention that afterwards took place between the Carthaginians and Numidians. Syphax and Masinissa were both kings in Numidia; but occupied different parts of this country. The subjects of the former were called Masæfuli, and their capital was Cirtha: those of the latter were the Massyli; but the name of Numidians was common to both. Their principal strength consisted in their cavalry; and they always rode without saddles, and some even without bridles, whence Virgil (*Æn.* l. iv. v. 41.) called them "Numidæ Infræni." A contest having occurred between these two princes, in the progress of which Syphax was defeated and captured, the dominions of this prince were bestowed upon Masinissa, and the Carthaginians were obliged to restore all which he possessed before. Masinissa had likewise seized part of a fertile territory, situated towards the sea-side, near the lesser Syrtis, which had been accustomed to pay tribute to the Carthaginians. Appeals had been made to Rome; but the contest remained undecided, though it was evident that the Roman senate favoured Masinissa. In a course of time the Carthaginians farther remonstrated against the encroachments of the Numidian prince; and complained to the senate of Rome, that, besides the lands at first contested, he had dispossessed them of upwards of 70 towns and castles. They likewise stated that they were restricted from seeking redress by the above-mentioned article of the last treaty. To their earnest application, and the counter-statement of Masinissa, the Roman senate replied, that the ancient limits should be preserved; and that it was far from being their intention to have the Carthaginians dispossessed, during the peace, of those territories and cities which had been reserved to them by the treaty. But these assurances, apparently impartial and even favourable to the Carthaginians, were

mere words. The Romans were secretly in the interest of Masinissa, and protracted the business, in order to give him an opportunity of establishing himself in his usurpation, and of weakening his enemies. A new deputation was sent from Rome in order to settle the dispute; and Cato was one of the commissioners. Masinissa professed to acquiesce in their decision; and the Carthaginians avowed their adherence to the treaty which they had concluded with Scipio. The deputies, after having visited the country and examined the state of Carthage, expressed their astonishment, that, after the calamities which it had suffered, it should have risen again, and so soon, to such a pitch of power and grandeur. When the members of the senate received this intelligence from the deputies, they declared, that Rome could never be in safety so long as Carthage should subsist. From this time, whatever affair was debated in the senate, Cato always added the following words to his opinion:—"I conclude that Carthage ought to be destroyed." At this time divisions broke out in Carthage; 40 citizens were sent into banishment; and the exiles withdrew to the court of Masinissa, who sent his sons to Carthage, to solicit their return. But the gates of the city were shut against them, and one of them was closely pursued by Hamilcar, one of the generals of the republic: this gave occasion to a new war; armies were levied on both sides; and a battle was fought in the presence of the younger Scipio, who afterwards ruined Carthage. The fight was long and obstinate, but at last the Carthaginians gave way. When the battle had terminated, the Carthaginians intreated Scipio to put an end to their contests with Masinissa; but having completed the object of his mission, he returned to Rome without settling the dispute, and reconciling the contending parties. In the progress of the contest, the Carthaginians, reduced to the greatest extremity by famine and the plague, surrendered to Masinissa, promising to deliver up the deserters, to pay him 5000 talents of silver in 50 years, and to restore the exiles, notwithstanding the oaths by which they had bound themselves to the contrary. They all submitted to the ignominious ceremony of passing under the yoke, which was a kind of gallows, made by two forked sticks standing upright, with a spear laid across, under which vanquished enemies were obliged to pass: and of 58,000 men, very few returned to Carthage.

The Carthaginians in this humbled and distressed state renewed their application to Rome; but their deputies, commissioned once and again to the senate, returned without satisfaction. At Rome disputes occurred between Cato and Scipio Nasica with respect to the measures that were proper to be pursued. Cato delivered a speech, in which he descanted on the powerful and prosperous state of Carthage, and ending his speech threw down some African figs, the size and beauty of which were much admired by the senators: "Know," says he, "that it is but three days since these figs were gathered; such is the distance between the enemy and us." Nasica, on the contrary, was of opinion, that the Carthaginians were too weak to subdue the Romans, and, at the same time, so powerful, that it was not for the interest of the Romans to consider them in a contemptible light. The senate, however, resolved to declare war against the Carthaginians; and the reasons or pretences for it were, their keeping up ships, contrary to the tenor of treaties, and their sending an army out of their territories, against a prince who was in alliance with Rome, and whose son they treated ill, at the time he was accompanied by a Roman ambassador. At the moment of their deliberation, deputies arrived from Utica, the second city of Africa, possessing a spacious harbour, and within 60 furlongs of Carthage, so that it might

serve as a place of arms in the attack of that city, surrendering themselves, their effects, their lands, and their city, into the hands of the Romans. They, therefore, hesitated no longer; but immediately proclaimed war, committing the conduct of it to the two consuls Manilius and L. Marcius Censorinus, and giving them secret orders not to end the war but by the destruction of Carthage. To them was committed a considerable fleet, on board of which were 80,000 foot, and about 4000 horse. Thus commenced, in the year B. C. 149, the *third Punic war*, about 53 years after the termination of the second, which, though much less considerable than either of the former, with regard to the number and importance of the battles that were fought, and its continuance, which was less than 4 years, was nevertheless much more remarkable, with respect to the success and event of it, as it ended in the total destruction and ruin of Carthage.

As soon as the senate had formed its resolution, a courier was sent to Carthage with its decree, and with information that the Roman fleet had failed. After many former and recent losses, which the Carthaginians had sustained, they were by no means in a condition to resist such an enemy, since they had not been able successfully to oppose Mafiniffa. Troops, provisions, ships, allies, in a word, every thing was wanting; and hope and vigour more than all the rest. As soon as it was known that the fleet was arrived at Utica, the deputies of Carthage repaired to the Roman camp, signifying that they were come in the name of the republic, in order to receive their commands, which they were ready to obey. The consul required the immediate surrender of all their arms. The order was instantly complied with; and there arrived in the camp a long train of waggons, loaded with all the preparatory implements of war, taken out of Carthage; 200,000 complete sets of armour, a numberless multitude of darts and javelins, with 2000 engines for shooting darts and stones. The deputies, accompanied by the most venerable senators and priests, followed, and received from Censorinus the consul, the heart-rending decree of the senate, "that it was their absolute will and pleasure that you depart out of Carthage, which they have resolved to destroy, and that you remove into any other part of your dominions, as you shall think proper, provided it be at the distance of 80 stadia from the sea." This decree was received with the most bitter anguish, and when it was communicated to the people, nothing was seen and heard in every part of the city but howling and despair, madness and fury. After this transaction, the consuls made no great haste to march against Carthage, as they knew the city was disarmed. However, the inhabitants, being unanimously resolved not to quit the city, took the advantage of this delay to put themselves in a posture of defence. They appointed as general, without the walls, Asdrubal, who was at the head of 20,000 men, and within the walls the command was given to another Asdrubal, the grandson of Mafiniffa. They then applied with great diligence and expedition to the manufacture of arms. The temples, the palaces, the open markets and squares, were all changed into arsenals, where men and women worked day and night. Every day were made 140 shields, 300 swords, 500 pikes or javelins, 1000 arrows, and a great number of engines to discharge them; and because they wanted materials to make ropes, the women cut off their hair for this purpose. During this interval the consuls were advancing towards the city in order to besiege it. The Carthaginians defended themselves with incredible resolution and vigour; and renewed the boldest sallies, for repulsing the besiegers, burning their engines, and harassing their foragers. Censorinus attacked the city on one side, and Manilius on the other. Scipio, afterwards surnamed Africanus, was then a tribune in the army; and distinguish-

ed himself above the rest of the officers, by his prudence as well as his bravery. The besieged, though thus powerfully assailed, were recovering their spirits, in consequence of some advantages which they gained. Their troops increased, and they obtained an accession of allies. This news occasioned some uneasiness at Rome; but the fame of Scipio had also arrived in the city; and when he appeared in the assembly, as a candidate for the ædileship, a general persuasion prevailed, that he was designed by the gods to end the third Punic war, as the first Scipio, his grandfather by adoption, had terminated the second. Instead, therefore, of granting him the ædileship, for which he was a candidate, they for once disregarded the laws, and conferred upon him the consulship, assigning him Africa for his province. As soon as Scipio had completed his recruits, he set out for Sicily, and soon after arrived at Utica. Immediately upon his arrival, he revived the discipline among the troops, and made several necessary regulations. Having ordered his troops to provide themselves with axes, levers, and scaling ladders, he led them in the dead of the night, and without the least noise, to a district of the city called Megara; when ordering them to give a general and sudden shout, he attacked it with great vigour. The enemy, though somewhat terrified by this unexpected attack, defended themselves so courageously, that Scipio could not scale the walls. But perceiving a tower that was forsaken, and which stood without the city, very near the walls, he detached thither a party of intrepid soldiers, who, by the help of pontons, got from the tower to the walls, and from thence into Megara, the gates of which they broke down. Scipio entered it immediately after, and drove the enemies out of that post; who, terrified at this unapprehended assault, and imagining that the whole city was taken, fled into the citadel; whither they were followed even by those forces that were encamped without the city, who abandoned their camp to the Romans, and thought it necessary to fly into a place of security. At day-break, Asdrubal perceiving the ignominious defeat of his troops, in order to be revenged on the Romans, and, at the same time, to deprive the inhabitants of all hopes of accommodation and pardon, brought all the Roman prisoners he had taken upon the walls, in the sight of the whole army. There he put them to the most exquisite tortures; putting out their eyes, cutting off their noses, ears, and fingers; tearing their skin to pieces with iron rakes or harrows; and then threw them headlong from the top of the battlements. This inhuman treatment filled the Carthaginians with horror; however, he did not spare even them, but murdered many senators who had been so brave as to oppose his tyranny. Scipio, having made himself absolute master of the isthmus, burnt the camp which had been deserted by the enemy, and built a new one for his troops; and by means of a high wall which he constructed, equal to the whole breadth of the isthmus, that is, 25 stadia, with towers and redoubts at proper distances, he lodged his forces in safety, and cut off all provisions from the besieged, thus producing a famine which soon after raged in the city. To deprive them more completely of necessary supplies, he attempted to stop up the mouth of the haven by a mole. This effort, however, was ineffectual; as the Carthaginians opened, on a sudden, a new outlet on the other side of the haven, and appeared at sea with a numerous fleet, which they had then built with the old materials found in their magazines. Having thus offered a kind of insult or bravado to the Romans, without immediately attacking their fleet, which it is said they ought to have done, they returned into the harbour. In a subsequent naval engagement, they were defeated. Scipio having made some further advances towards the distress and capture of the city, terminated this campaign.

campaign. During the winter-quarters, he endeavoured to overpower the enemy's troops without the city; and in his last action cut to pieces above 70,000 of the enemy, as well soldiers as peasants, who had been enlisted, and carried a neighbouring fort, called Nopheris, after sustaining a siege of 22 days. The seizure of this fort was followed by the surrender of almost all the strong holds in Africa; and contributed very much to the taking of Carthage itself, into which, from that time, it was almost impossible to bring any provisions. Early in the spring, Scipio attacked, at one and the same time, the harbour called Cothon, and the citadel. In the progress of this business a dreadful slaughter took place for 6 days; but on the 7th day, when it was expected the siege would have continued much longer, and much more blood have been shed, there appeared a company of men in a suppliant posture and habit, who desired no other conditions but that the Romans would please to spare the lives of all those who should be willing to leave the citadel. The request was granted to all, except the deserters; and, accordingly, 50,000 men and women came out. The deserters, about 500 in number, finding that they had no quarter to expect, fortified themselves in the temple of Æsculapius, with Asdrubal, his wife, and two children; where they might have held out a long time, though their number was small, as the temple stood on a very high eminence of rocks, to which the ascent was by 60 steps. But at length their patience was exhausted, and they abandoned the lower part of the temple, and retired to the uppermost story, resolving not to quit it but with their lives. Asdrubal came down privately to Scipio, and, being desirous of saving his life, threw himself at the feet of the Roman general; by whom he was exhibited to the deserters, who, transported with rage at the sight, poured out their imprecations against him, and set fire to the temple. Whilst it was lighting, we are told, that Asdrubal's wife, dressing herself as splendidly as possible, and placing herself with her two children in sight of Scipio, addressed him with a loud voice: "I call not down," says she, "curses upon thy head, O Roman; for thou only takest the privilege allowed thee by the laws of war; but may the gods of Carthage, and thou, in concert with them, punish, according to his deserts, the false wretch, who has betrayed his country, his gods, his wife, his children!" Then, directing herself to Asdrubal, "Perfidious wretch," says she, "thou basest of creatures! this fire will presently consume both me and my children; but as to thee (too shameful general of Carthage!) go—adorn the gay triumph of thy conqueror—suffer, in the sight of all Rome, the tortures thou so justly deservest!" She had no sooner pronounced these words, but seizing her children, she cut their throats, threw them into the flames, and afterwards rushed into them herself, in which she was imitated by all the deserters.

As for Scipio himself, when he saw the ruin of this famous city, he shed tears over its fate; and reflecting that cities, nations, and empires, are liable to revolutions no less than individuals; that the like sad fate had befallen Troy, anciently so powerful; and, in later times, the Assyrians, Medes, and Persians, whose dominions were once so extensive; and, lastly, the Macedonians, whose empire had been so glorious throughout the world; these mournful ideas suggested to him the following verses of Homer, which he repeated:

"Ἔσται ἡμεῖς, ὅταν πῶς ἐλῶν Ἴλιος ἱρή,
καὶ Πρίαμος καὶ λαὸς ἑὺμμελίῳ Πριάμοιο."

Il. 2. 164, 165.

"The day shall come, that great avenging day,
Which Troy's proud glories in the dust shall lay,
When Priam's powers and Priam's self shall fall,
And one prodigious ruin swallow all." Pope.

By this citation he denounced the future destiny of Rome, as he himself confessed to Polybius, who desired Scipio to explain himself on that occasion.

After the capture of Carthage, Scipio gave the plunder of it (the treasures of the temples excepted) to his soldiers for some days. He also ordered the inhabitants of Sicily to come and take possession of the pictures and statues which the Carthaginians had despoiled them of, in the former wars; and he restored to the citizens of Agrigentum, Phalaris's famous bull (see BULL), admonishing them, that this bull, which was a monument of the cruelty of their ancient kings, and of the lenity of their present sovereigns, ought to make them sensible, which would be most advantageous for them, to live under the yoke of the Sicilians, or the government of the Romans. When he exposed to sale part of the spoils of Carthage, he expressly prohibited, under the severest penalties, his own family from taking or buying any of them; thus preventing any suspicion of avarice from being attached to himself. When the news of this event arrived at Rome, the senators sent 10 commissioners to Africa, whose first care was to demolish every remnant of Carthage; and they also issued orders, that it should never again be inhabited, and denounced dreadful imprecations against those, who, contrary to this prohibition, should attempt to rebuild any parts of it, especially those called Byrsa and Megara. The commissioners further decreed, that those cities, which, during this war, had joined with the enemy, should be all razed, and their territories be given to the Roman allies; making a particular grant to the citizens of Utica of the whole country lying between Carthage and Hippo. All the rest they made tributary, and reduced it into a Roman province, whither a prætor was sent annually. See CARTHAGE.

Such was the termination of the third Punic war; and such was the final catastrophe of the Carthaginian state, in the year B. C. 146; after it had subsisted, through various vicissitudes, for 737 years. Rollin's Anc. Hist. vol. i. Rollin's Rom. Hist. vols. iii, iv, v. Anc. Univ. Hist. vols. xv, xvi.

CARTHAGO, in *Ancient Geography*, a town of Asia, in Greater Armenia, called afterwards *Artaxata*; which see.

CARTHAGO *Vetus*, a name given by Ptolemy to a town in the interior of Spain, in the country of the Ilsercaons, situate on this side of the Ebrus.

CARTHAGO, or CARTAGO, in *Geography*, a town of New Spain, in North America, in the province of Costa Rica, being a bishop's see and the seat of a Spanish governor; formerly considerable, but now much reduced; 360 miles W. of Panama. N. lat. 9° 5'. W. long. 83°.

CARTHAMUS, in *Botany*, (either from *Karten*, the name given in Morocco to the original species, or from *καθαρῶς*, *purgo*, on account of its purgative quality. Tournefort prefers the latter, but Ray asserts that the former is the true etymology.) Brunfels. *Tragus*. Fuchs. J. and C. Bauh. Ray. Gerard. Tournef. Cl. 12. §. 3. gen. 1. tab. 258. Linn. gen. 931. Schreb. 1261. Willd. 445. Gært. 929. Juss. p. 174. Vent. vol. ii. p. 496. Class and order; *Syngenesia polygamia equalis*. Nat. ord. *Compositæ capitata*, Linn. *Cinarocephale*, Juss.

Gen. Ch. *Calyx* common ovate, imbricated; scales with lateral and terminal spines, and in most species with a foliaceous appendicle at their summit. *Cor*: common uniform; florets all androgynous, equal, monopetalous, funnel-shaped; border five-cleft, erect, nearly equal. *Stam*. Filaments five, capillary, very short; anthers united into a tubular cylinder. *Pist*. Germ very short; style filiform, longer than the stamens. *Peric*. none, except the closing calyx. *Seeds* solitary;

CARTHAMUS.

tary; down none, or chaffy. *Recep.* flat, hairy; hairs longer than the seeds.

Eff. Ch. Outward calyx-scales with more than one spine. *Lam.*

Sp. 1. *C. tinctorius*, bastard saffron, or safflower, Linn. Sp. Pl. 1. Mart. 1. Willd. 1. Gært. tab. 161. fig. 2. *Lam.* Ill. Pl. 661. fig. 3. *Carthamus officinarum*, Tourn. Baul. pin. "Leaves ovate, entire, ferrate-aculeate." Linn. "Stem perfectly smooth; leaves ovate, entire, spinous-toothed; seeds naked." Willd. *Root* annual. *Herb* smooth in all its parts. *Stem* about two feet high, erect, cylindrical, woody, branched toward the summit. *Leaves* simple, entire, acuminate, veined, with spinous teeth at their edges; root-leaves oblong, narrowed at the base; stem-leaves small, ovate, half-embracing the stem. *Flowers* rather large, terminal, solitary; calyx-scales broad at the base, flat, resembling the leaves; florets of a fine saffron colour. *Seeds* white, naked. A native of Egypt and the warmer parts of Asia. The seeds have a purgative quality, and are said to be particularly useful when the first passages are surcharged with a thick viscous mucus. They are a favourite food of parrots, on whom they do not produce a similar effect. The flowers are supposed to have the same medicinal properties as saffron: but they are chiefly used as a material for dyeing silk and cotton stuffs, to which they give a beautiful, but fugitive rose-colour. A red pigment is likewise prepared from the stamens, used by painters, and known as a cosmetic rouge by the Parisian ladies, under the name of vegetable rouge, Spanish vermilion, or lake of carthamus. 2. *C. fivescens*, Willd. 2. (*C. orientalis*, Tourn. cor. 33.) "Stem perfectly smooth; leaves oblong, entire, spinous-toothed, seeds crowned with down." Willd. *Root* annual. *Stem* erect, white, branched. *Leaves* oblong, narrower than those of *C. tinctorius*, sessile, undivided, toothed; teeth spinous; spines awl shaped, yellowish, long. *Florets* yellow. A native of Armenia. 3. *C. persicus*, Willd. 3. Desfont. "Stem perfectly smooth; leaves lanceolate, entire, spinous-toothed; outer calyx-scales longer than the flower, spreading, spinous-toothed at the base." *Root* annual. *Spines* white. A native of Persia. 4. *C. dentatus*, Willd. 4. Vahl. symb. 1. tab. 17. Fo. sk. descrip. 217. (*Cnicus atractylidis folio*, flore purpurascens, Tourn. Cor. 33.) "Stem villous; leaves pubescent, lanceolate, entire, spinous-toothed, inner calyx-scales somewhat roundly dilated at the summit, scarious, toothed. A native of Asia Minor. 5. *C. lanatus*, yellow distaff thistle, or woolly carthamus, Linn. 2. Mart. 2. *Lam.* 2. Willd. 5. (*Cnicus atractylis lutea dictus*, Tourn. 451. *Atractylis lutea*, Bauh. pin. 379. *Atractylis fufus agrestis*, Gært. tab. 161. fig. 2. Chardon beni of the Parisians.) "Stem hairy, woolly towards the top; lower leaves pinnatifid, upper ones embracing the stem, toothed." Linn. "Stem woolly; lower leaves pinnatifid, toothed; upper ones embracing the stem, pinnatifid, toothed." Willd. *Root* annual. *Stem* about two feet high, upright, cylindrical, branched towards the summit, cobwebbed between the bractes. *Leaves* oblong, spinous. *Flowers* yellow, solitary at the end of each branch, forming all together a kind of corymb; outer scales of the calyx foliaceous, reticularly nerved, pinnatifid-spinous, very prickly; inner ones cartilaginous, appendicled, ciliated, ending in a sharp spine; receptacle beset with bristle-shaped chaff. *Seeds* inversely pyramidal; those in the circumference differing a little in shape from those of the circumference. *Lam.* and Gært. The leaves are rather bitter, and are sometimes used as a febrifuge and sudorific. A native of uncultivated ground and the borders of fields in the south of France, Spain, and Italy, where the women use its stalks for distaffs. 6. *C. creticus*, Linn. 3.

Mart. 3. *Lam.* 3. Willd. 6. (*Cnicus creticus flore leuco*, phæo, Tourn. Cor. 33.) "Stem nearly even; calyxes a little woolly; florets about nine; lower leaves lyrate; upper ones half-embracing the stem, toothed." Linn. "Stem even; calyxes nearly smooth; flowers whitish." *Lam.* *Root* annual. *Stem* near four feet high, very white. *Leaves* stiff, deeply indented, armed with strong spines. *Florets* few, whitish, and according to Haller with five black lines at the opening, which divide and make the edges of the segments black. Haller also asserts that the radical florets of this and the preceding species are neuter and abortive, whence Jusfieu refers them both to his genus calcitrapa, formed from the centaurea of Linnæus. Gathered by Tournefort in the Island of Candia, who sent the seeds to the royal garden at Paris. 7. *C. pectinatus*, Willd. 7. Desf. Atl. tab. 228. "Stem villous; calyxes smooth; leaves pectinate toothed, spinous; lower ones linear-lanceolate; upper ones ovate." *Lam.* *Root* perennial. *Leaves* smooth. *Flowers* in a corymb; calyx-scales spinous-ciliated on each side; awl shaped and pungent at the summit. Desf. A native of uncultivated mountains in Barbary. 8. *C. multifidus*, Willd. 8. Desf. Atl. tab. 227. "Stem somewhat villous; lower leaves pinnatifid; segments gash-toothed, spinous; upper ones ovate-lanceolate, spinous-toothed." *Flowers* in a corymb; calyx-scales ciliate-spinous at the edges, awl-shaped at the tip. Desf. A native of uncultivated hills about Algiers. 9. *C. tingitanus*, Linn. 4. Mart. 4. Willd. 9. (*Carduus cæruleus erectus*, Morif. hist. tab. 34. fig. 19.) "Root-leaves pinnate; stem-leaves pinnatifid; stem one flowered." Linn. *Root* perennial. *Stem* a foot and half high, seldom branched. *Leaves* narrow-spear-shaped, deeply ferrated; each of the ferratures ending in a sharp point. *Flowers* blue; scarcely distinct from the next species. Linn. A native of Barbary, about Tangier. 10. *C. cæruleus*, Linn. 5. Mart. 5. *Lam.* 4. Willd. 10. (*Onobroma cæruleum*, Gært. tab. 160. fig. 7. *Cnicus cæruleus asperior*, Bauh. pin. 378. Tourn. 350. *Cn. alter*, Clus. hist. 2. p. 152. Lob. ic. 2. p. 19.) "Leaves lanceolate, spinous-toothed; stem generally one-flowered." Linn. *Root* perennial. *Stem* single, purplish, hairy and channelled. *Leaves* covered with a short, hairy down. *Flowers* blue; outer calyx-scales broad, long, with sharp spines on their edges; inner ones narrow, terminated with a sharp thorn. A native of Spain and the coast of Barbary. Miller asserts that it is extremely different from the preceding: but La Marck observes, that though the tingitanus of Linnæus may perhaps be a distinct species, Morison's carduus cæruleus appears to him to be only a variety of the present. 11. *C. helenoides*, Willd. Desf. Atl. tab. 230. "Stem generally one-flowered; leaves ovate; lower ones quite entire; upper ones slightly toothed, not spinous." *Root* annual. *Leaves* smooth, embracing the stem. *Flowers* yellow; calyx-scales ferrated, a little spinous. A native of corn fields in Barbary, near Mascar. 12. *C. pinnatus*, Willd. 12. Desf. tab. 229. "Stem one-flowered; leaves pinnate; pinnæ often trifid, spinous ferrated; inner calyx-scales scarious and toothed at the tip." *Root* perennial. *Flowers* blue. A native of Barbary. 13. *C. carduncellus*, Linn. 7. Mart. 7. *Lam.* 5. Willd. 14. (*Cnicus cæruleus humilis montis Lupi*, Tourn. 451. *Carduncellus*, Morif. tab. 33. fig. 15.) "Stem-leaves linear, pinnate, the length of the plant." Linn. "Stems weak, one-flowered; leaves long, scarcely spinous; root-leaves lyrate; stem-leaves pinnate; pinnæ narrow, decurrent." *Lam.* *Root* perennial. *Stems* several, about six inches high, simple, sometimes a little woolly. *Flower* blue, large, terminal: outer calyx-scales foliaceous, inner ones smooth, ciliated at their summit, and terminated by a small scarious appendage; down of the seed capillary,

capillary, unequal, deciduous. A native of the south of France. 14. *C. mitissimus*, Linn. 6. Mart. 6. Willd. 13. (*C. humilis*, Lam. 6.?) "Leaves not spinous; root-leaves toothed; stem-leaves pinnate." Linn. "Generally stem-leaves; leaves spreading on the ground; flower large." Lam. Root perennial. Stem sometimes none; sometimes four inches high, smooth, slightly striated, with one or two leaves. Root-leaves, some lanceolate, dilated at the end, and very smooth, toothed from the middle to the end; teeth turned upwards, sharp, ending in a small thorn; others pinnatifid; pinnæ linear-lanceolate, refalcated, quite entire, some of them eared at the base underneath. Stem-leaves interruptedly pinnatifid. Flower bright blue; calyx large; outer scales foliaceous, concave, spinous-ciliated, often quite entire, seldom lacinated, and generally destitute of conspicuous veins or nerves; inner ones narrower, obtuse; membranous, dilated, and ciliated at the tip. Down of the seed capillary. Gouan. A native of France. 15. *C. arborefcens*, Linn. 9. Mart. 8. Lam. 7. Willd. 15. (*Cnicus hispanicus arboreus*, Tourn. 451.) "Leaves sword shaped, sinuate-toothed." Linn. Root perennial. Whole plant pubescent. Stem six feet high, firm, ever-green. Leaves clasping the stem, green, veined, very spinous at their edges; lower ones near a foot long, sinuated, or pinnatifid, with spinous teeth. Flower most commonly solitary, yellow, of a pleasant smell; outer calyx-scales foliaceous, spinous; inner ones ciliated; down of the seed capillary. A native of Spain. 16. *C. maculatus*, Lam. 8. (*Carduus marianns*, Linn. Eng. bot. 976. Curt. Lond. tab. 54. *Silybum marianum*, Gært. tab. 162. fig. 2.) "Leaves sinuated, toothed-spinous, embracing the stem; calyx-scales appendicled, spinous at the margin and tip." Lam. Root annual. Stem five or six feet high, branched, furrowed, smooth. Leaves large, deep green, beautifully variegated with milk-white veins; root-leaves pinnatifid; stem-leaves alternate, recurved, oblong, acute, repand, generally smooth, ciliated at the edge with unequal spines. Flowers purple, terminal, solitary, large, on naked peduncles; calyx-scales very different from those of *carduus*, distinctly appendicled, armed with lateral and terminal spines. A native of road sides, &c. in England, France, and other parts of Europe. There is a variety not unfrequent in the neighbourhood of London without variegated leaves. The common sort was held in great veneration by the physicians and botanists of the dark ages, having, as they imagined, derived its white veins from the milk of the Virgin Mary, which accidentally dropt upon it. Its root, leaves and seeds are sudorific, cooling, and diuretic. It has also been recommended as a pectoral, and is said to have been taken with effect in pleurisy. 17. *C. corymbosus*, Linn. 8. Mart. 10. Lam. 9. (*Chamæleon niger*, Bauh. pin. 380. Dalech. hist. 1454. Lob. ic. 2. p. 5. *Carduus chamæleon*, Morif. tab. 33. fig. 17. *Brotera corymbosa*, Willd.) "Flowers in a corymb, numerous." Linn. Whole plant formidably spinous. Root perennial. Stem from six to nine inches high, upright, channelled, branching into a corymb at its summit. Root-leaves rather large, spreading on the ground, dark green, smooth, deeply divided; divisions pinnatifid, toothed and spinous. Stem leaves small, oblong, sessile; armed at their edges with short, stiff, double spines. Flowers small, of a clear blue colour, (white, Miller), forming with their bractes a dense cluster at the ends of the branches; calyx oblong; scales armed with spines at their edges and summit. A native of the south of Italy, Romania, and Sardinia. It has the habit of *echinops*, and according to Willdenow, properly belongs to the order *segregata*, where he has placed it as a distinct genus next to *echinops*, but La Marck asserts that it has

all the characters of *carduus*, and ought not to be separated from the other species of this genus. No author besides Willdenow has mentioned a proper calyx to each floret. 18. *C. canescens*, Lam. 10. (*C. acarna*, Juss. *Cnicus acarna*, Linn. 7. Mart. 5. Willd. 8. *Cnicus polycephalos*, Tourn. 451, &c. *Acarna major caule foliofo*, Bauh. pin. *Chamæleon salmanticensis*, Clus. hist. 2. p. 155. Lob. ic. 2. p. 17.) "Leaves narrow-lanceolate, decurrent, toothed, armed with yellowish spines; calyxes conical, woolly; scales pinnate-spinous near the tip." Lam. Root perennial. Stem a foot and half high, erect, winged, branched, forming a corymb at its summit. Leaves whitish. Flowers purple, oblong or conical, clustered and sessile at the summits of the branches, surrounded by bractes; florets small; calyx woolly; scales terminated by an appendage, armed with yellowish lateral and terminal spines. A native of Spain and the south of France. 19. *C. magellanicus*, Lam. 14. "Leaves linear, quite entire, smooth; stem herbaceous, one-flowered." Stem six or seven inches high, simple. Leaves smooth, without spines; lower ones long, numerous, growing near together. Flower terminal, small, naked; outer calyx-scales ovate, smooth, a little appendicled, with very short lateral spines. Found in the Straits of Magellan by Commerçon. 20. *C. sulcifolius*, Linn. Jun. Supp. p. 550. Mart. 9. Lam. 15. Willd. 16. "Stem shrubby; petioles spinous; leaves lanceolate, entire, downy underneath, prickly at the tip; branches one flowered." Branches long, whitish, cottony. Leaves scattered, nearly sessile, smooth and veined above, clothed with a white cottony, or silky procumbent down underneath, terminated by a feeble spine. Flowers white, solitary, terminal, naked; calyx short; scales imbricated, appendicled, white on the outside, bordered with spinous teeth; down of the seed feathery, on which account Ventenat is inclined to think it an *atractylis*. A native of the Island of Madeira. La Marck, Encyc. vol. i. p. 639, 640, has removed *atractylis cancellata* and *gummifera* of Linnæus to this genus; but his successor Poiret has remanded them back again to their former station. See Encyc. vol. vi. p. 29, 30, sub *Quenouillette* and *Atractylis* of this dictionary.

Obf. Gärtner makes *naked seeds* an essential part of the generic character. His *carthamus* of course includes only the first species, all the others having their seeds crowned with down; and even in that, the seeds are said by Jussieu, Ventenat, and du Tour, not to be naturally naked, though the down, being extremely caducous, has escaped the notice of most authors.

Propagation and Culture.—The first species has been cultivated in Egypt from the earliest ages for the use of dyers. From 16 to 18,000 hundred weight of flowers is the present average annual produce; seven eighths of which are exported to Europe; the rest is consumed in the country and other parts. It was not known in Italy in the time of the elder Pliny, but it is said by Allioni to be now found apparently wild, or at least perfectly naturalized in the neighbourhood of Nice. It is cultivated with success in some parts of Germany, where its seeds come to complete maturity; and was introduced into England, as appears from Turner's herbal, as early as 1551. In the year 1683, twenty-five acres in the vale of Evesham, in Gloucestershire, were sowed with its seed, and the produce was such as might have justified a farther trial. No attempt of the kind, however, has since been made; and there is perhaps reason to apprehend that in our variable climate, and with our frequent wet summers, the crop would always be uncertain; for the quality of the flowers is considerably impaired if they are exposed to rain in the interval between their open-

ing and being gathered for use. In Germany it is sown in the lightest land, which has always a double fallow given to it, first to destroy the weeds, and afterwards to make it fine. After it has been fallowed a summer and a winter, and has been ploughed and harrowed four times, it receives its last ploughing and harrowing in the latter end of March. The seeds are then scattered thinly in drills, made with a small plough, about a foot and half from each other, and the earth is drawn into them with a harrow, whose teeth are little more than an inch long: a roller is finally drawn over the ground to smooth and to settle it. After the plants are come up they are hoed three times, about five or six weeks between each time; and as soon as the flowers begin to open, the field is gone over once a week to gather such as are ready. There is usually a succession of flowers for five or six weeks; but great care should be taken that there be no dew upon them when they are gathered. They are immediately dried in a kiln, and may then be pressed close without fear of detriment. In Spain this plant is cultivated in their gardens, as marigolds are in England, to give a colour to their soups, olios, and other viands. Considered merely as an ornament, it is worthy of a place in the borders of our large gardens, as it continues in flower eight or ten weeks. The seeds should be sown about the beginning of April, in the ground where the plants are intended to remain, for the roots are injured by transplanting. Most of the other species will stand our winter in the open ground, but several of them will scarcely ripen their seeds; such of them as are perennial may, however, be readily increased by parting the roots. See SAFFLOWER.

CARTHAMUS Africanus frutescens, Walth. hort. See *ATRACTYLIS oppositifolia*.

CARTHARA, in *Ancient Geography*, a town of Mesopotamia.

CARTHEUSER, JOHN FREDERIC, in *Biography*, professor of medicine at Francfort on the Oder, acquired considerable reputation about the middle of the last century, by several very luminous works on the subjects of botany and pharmacy. The principal of these are "*Rudimenta Medicæ medicæ rationalis*." Francof. 8vo. 1741, reprinted in 1749, much enlarged and improved, in two volumes 8vo. Besides describing the simples, and the method of preparing and compounding them, the author has given the result of his own experience of their virtues. "*De Genericis quibusdam Plantarum Principiis, hæcenus plerumque neglectis*." Francof. 1754, 8vo. A valuable work, Haller says, in which the author introduces several articles not before found in similar publications, particularly of the trees producing wax, a substance like butter, and a kind of suet. The trees are natives of China. Besides the above, there is a variety of dissertations, mostly on interesting subjects. The titles, with short accounts of them, are given in Haller's *Bib. Botan.* See also *Eloy*. *Dict. Hist.*

His two sons, Frederic Augustus, and William, became also doctors in medicine, under the auspices of their father. The principal of the works left by them are, "*Elementa Mineralogiæ systematicæ disposita*." Francof. 1755, 8vo, by the elder; and "*Dissertationes physico-chemico-medice, de quibusdam materiæ medicæ subjectis*," 8vo. 1774; and "*Dissertationes nonnullæ selectiores, phys. chem.*" 8vo. 1775, including some written by the father, and by other writers.

CARTHUSIANS, in *Ecclesiastical History*, a branch of the **BENEDICTINS**, an order of religious, instituted by S. Bruno, about the year 1084 (some say in 1080, and others in 1086), remarkable for the austerity of their rule, which obliges them to a perpetual solitude; a total abstinence from

flesh even at the peril of their lives; and to feed on bread, water, and salt, one day in every week; and absolute silence, except at certain stated times.

Their houses were usually built in deserts, their fare coarse, and their discipline severe. It is observed, that the monastical piety is still better preserved in this, than in any of the other orders. M. l'Abbé de la Trappe, however, endeavours to shew, that the Carthusians do not live up to the austerity enjoined by the ancient statutes of Guigues, their fifth general. M. Maffon, general of the order, answers the abbé; and shews that what he calls the statutes, or constitutions of Guigues, are, in reality, only customs compiled by father Guigues; and that they did not become laws till long after.

The word is formed from *Carthusianus*, or *Carthusiensis*, a denomination given them in Latin, from a village in Dauphiny called *Chartreuse*, in Latin *Cartusium*, *Catursum*, as some say, where the first monastery of this kind was erected. Hence the French call the religious of this order *Chartreux*, and their convents *Chartreuses*; an appellation which also appears to have anciently obtained in England; whence the name of that celebrated hospital, or rather college, in London, the Charter-house; by corruption from *Chartreuse*.

The Carthusian habit is all white within, their scapular being joined in the sides by two pieces of the same stuff. They wore a hair shirt next their skin. Their prior and procurator, who may go abroad upon the necessary affairs of the house, appear in a black cloak down to the ground, and a black hood over the white one; the hood not round, but tapering to a point.

There are few nuns of this order. There have, however, been some female Carthusian convents; but the increase of them was prohibited in 1368; so that there remained only five, four in France, and one at Bruges in Flanders. As the rigorous discipline of the Carthusians is altogether inconsistent with the tenderness and delicacy of the female sex, the austerity of the order has been diminished in the female convents; and it was more particularly found necessary to abrogate those severe injunctions of silence and solitude, that are so little adapted to the known character and genius of the sex. They were brought into England by Henry II. about the year 1180, and had only nine houses; their first house being at Witham in Somersetshire.

CARTHUSIAN powder, *poudre des Chartreux*. See **KERMES mineral**.

CARTIER, or **QUARTIER**, JAMES, in *Biography*, an eminent navigator, was born at St. Malo's, where he distinguished himself as a skilful pilot. Francis I. employed him to prosecute discoveries in Canada, for which purpose he made a voyage thither in 1534, examined the country with great attention, and gave an exact description of all its islands, coasts, capes, bays, &c. which was of great use to subsequent navigators.

CARTILAGE, in *Anatomy*, is a semipellucid substance, of a milk-white or pearly colour, entering into the composition of several parts of the body. It holds a middle rank in point of firmness, between bones, or hard parts, and the softer constituents of the human frame. It appears, on a superficial examination, to be homogeneous in its texture: for, when cut, the surface is uniform, and contains no visible cells, cavities, or pores, but resembles the section of a piece of glue. The cartilages of the ribs, however, particularly in adults, present a kind of fibrous appearance in their texture: and Dr. Hunter has discovered, by microscopical examination, that the cartilaginous crusts of articular surfaces are composed of straight parallel fibres directed towards the cavity

cavity of the joint. (Philos. Transact. N^o 470.) This substance possesses a very high degree of elasticity; which properly distinguishes it from all other parts of the body. Hence it enters into the composition of parts, whose functions require the combination of firmness, with pliancy and flexibility: the preservation of a certain external form, with the power of yielding to external force or pressure.

Cartilages are covered by a membrane, resembling in texture and appearance, as well as in its office, the periosteum of bones: this is termed the perichondrium. They receive arteries and veins from this membrane: these vessels, however, have never been demonstrated in the cartilaginous crusts of articular surfaces. Absorbent vessels cannot be actually shewn: but their existence is abundantly proved by many phenomena. The conversion of cartilage into bone is alone sufficient for this purpose. The cartilaginous substance is gradually removed as the formation of the bone advances. In affections of the joints their cartilaginous coverings are often both entirely destroyed, or partially removed; which appearance can only be ascribed to the action of absorbent vessels. It does not seem to possess nerves, as it is entirely destitute of sensibility.

Its colour is not affected by feeding an animal with madder.

It resists the effects of pressure from contiguous disease, longer than the bones, or the soft parts of the body. Dr. Hunter has observed this in the cartilages of the ribs; and the same fact is also witnessed in those of the vertebrae, in the case of aneurysm in the descending aorta.

It does not exfoliate like the substance of bones.

When destroyed, it is never reproduced. We have observed a curious exemplification of this fact in cases of unreduced luxation. The head of the dislocated bone has its cartilaginous crust gradually worn away by friction against the surrounding parts; this is never replaced; but the substance of the bone itself becomes highly polished. The new cavity, which is ultimately formed for it in the bone, on which it lies, has no cartilaginous surface, but is polished in the same way.

The thinner cartilages of the body are resolved by maceration into a kind of fibrous substance: e. g. those of the organs of sense. These are the softest, and most flexible in the body. Those of the ribs, if boiled or macerated for some months, seem to consist of oval laminae, surrounding each other concentrically, and connected by transverse fibres. These are much more dense and elastic. The intervertebral and interarticular cartilages, with that of the symphysis pubis, obviously contain a considerable intermixture of tendinous fibres; and may be resolved into a cellular texture.

Digestion, in a close vessel, dissolves cartilages, and converts it into a jelly.

The cartilages of the body are divided, by anatomists, into two kinds: the temporary and the permanent. The former are confined to the earlier stages of existence; the latter commonly retain their cartilaginous structure throughout every period of life. The temporary cartilages are those in which the bones of the body are formed. They are hence called by Latin writers *Ossificantes*. All the bones in the body, except the teeth, are formed in a nidus of cartilage. The form of the bone, with its various processes, is accurately represented in these cartilaginous primordia; and it is the substance alone which changes. In the early periods of foetal existence, these cartilages are of a soft and gelatinous texture: they become firmer and harder as the growth of the subject advances. No difference is observed in the cartilage, whether a long or a broad bone is to be

formed in it; whether the future bone be of the reticulated or compact structure. As the ossific matter is deposited, the cartilaginous substance is absorbed. The epiphyses are still connected to the body of the bone by cartilaginous crusts, after they are completely ossified; but this part is ultimately consolidated.

The permanent cartilages are of various kinds. The external ear, the external aperture of the nostrils, and the eyelids, are composed of a thin and flexible cartilage, inclosed in a duplicature of the common integuments. See *EYE*, *EAR*, and *NOSE*.

The larynx is entirely composed of this substance, and the trachea, with its branches, is furnished with pieces of cartilage, by which these tubes are kept permanently open, for the ready passage of air to and from the lungs. See *LARYNX* and *TRACHEA*.

Portions of a dense and elastic cartilage are annexed to the anterior extremities of the ribs; and in the seven first ribs are articulated to the side of the sternum. The elasticity of these parts constitutes a chief instrument of respiration, by restoring the ribs to their former position when the action of the intercostal muscles has ceased.

Contiguous bones are sometimes united by the intervention of cartilage: as the two ossa pubis, the sacrum and ossa innominata, and the two bones of the sternum. This species of junction is technically termed *synchondrosis*.

The bodies of the vertebrae are joined by large masses of a peculiar substance, partaking of the properties and appearance of cartilage and ligament; which allow of the motions of these parts on each other, without weakening the support which is afforded to the upper parts of the body in general, and to the head in particular, by the vertebral column. These cartilages impart a great elasticity to the spine; by which the effects of concussion, from jumping, from falls, &c. are weakened, and destroyed, before they can be propagated to the head. When the body has been long in an erect position, the compression of these cartilages by the weight of the upper parts of the body, diminishes the height of the person. They recover their former length, when freed from the pressure of the superincumbent parts. Hence a person is taller when he rises in a morning, than after sustaining the fatigues of the day; and the difference has sometimes amounted to an inch. (Philosophical Transactions, No. 383. Hist. de l'Acad. des Sciences, an. 1725.) *

Cartilages are sometimes interposed between the articular surfaces of bones; where they fill up irregularities, that might otherwise impede the motions of the part; and increase the security of the joint, by adapting the articular surfaces to each other. Instances of this are found in the articulation of the lower jaw; in the connection of the clavicle with the sternum, and in the knee-joint. These are called *interarticular cartilages*.

The articular surfaces of bones are in every instance covered by a thin crust of cartilage, having its surface most exquisitely polished, by which all friction in the motions of the joint is avoided, and the ends of the bones glide over each other with the most perfect facility.

These permanent cartilages become not unfrequently more or less ossified in old persons. The cartilages of the larynx, particularly the thyroid and cricoid, and those of the ribs, are generally affected in this way in an advanced age: yet some instances have been observed, where this change had not taken place, even in very old subjects, as, e. g. in the case of Thomas Parr, who was examined by Harvey. (Sectio Thomae Parre, Lond. 1669, 8vo.) and of another person of 130 years old by Keil. (Phil. Trans. No. 306.) The

symphysis of the pubis, and that of the ilium and sacrum, are very rarely affected indeed; and ossific union of the bodies of the vertebræ is also very uncommon.

The reader may consult on the subjects of this article, J. G. Haase Differt. de Fabricâ Cartilagineum, Lipsiæ, 1767. 4to. and the first vol. of Soemmerring's work, De Corporis humani Fabricâ.

CARTILAGINOUS fishes, *Pisces Cartilaginei*, and *Les Poissons Cartilagineux* of the French. The fishes of this tribe are distinguished by having, as their name implies, a cartilaginous instead of bony skeleton.

The cartilaginous fishes are numerous, embracing the whole of the two last orders of Ichthyology, the *Branchiostegi*, and *Chondropterygii*, in which the following genera are contained, *Morrayrus*, *Ostracion*, *Tetrodon*, *Diodon*, *Syngnathus*, *Pegafus*, *Centricens*, *Balites*, *Cyclopterus*, *Lophius*, *Acipenser*, *Chimera*, *Squalus*, *Raja*, *Petromyzon*, and *Gastrophilus* (myxine, Linn.)

Linnæus separated the cartilaginous from the other fishes, and placed them in the class Amphibia, where they constituted the order Nantes. This distribution was made under the supposition of the cartilaginous fishes being furnished both with lungs and gills, an idea apparently confirmed by the observations of Dr. Garden of South Carolina, who at the desire of Linnæus examined the organs of the genus *Diodon*, and found, as he conceived, both external gills, and internal lungs. These supposed lungs, however, have been since ascertained by naturalists to be only a peculiar modification of the gills, and it therefore now appears that this cartilaginous tribe are, in reality, fishes, differing principally, if not entirely, from other fishes in having, as before mentioned, a cartilaginous skeleton. They differ from the generality of other fishes, in having the gills destitute of bony rays, or in the gills being cartilaginous; and they are deficient, for the most part, at least, of obvious scales, those being either very deciduous, minute, or so deeply imbedded in the skin as to be scarcely visible: in many of the cartilaginous fishes there is not even the slightest appearance of scales on the surface of the skin. See FISHES and ICHTHOLOGY.

CARTILAGINOUS leaf, among *Botanists*. See LEAF.

CARTILI, in *Ancient Geography*, a bay of Africa, where vessels sheltered themselves from the easterly wind; situate N.E. of the mouth of the river Chinalaph.

CARTILIS, a place of Africa, in Mauritania Cæsariensis, between Cartennæ and the colony of Cæsarea, according to the Itinerary of Antonine.

CARTINAGA, a town of India, on this side of the Ganges. Ptolemy.

CARTISMANDUA, in *Biography*, queen of the Brigantes in Britain about the middle of the first century, justly incurred infamy by causing Caractacus, who had put himself under her protection with promises of safety, to be arrested and delivered up to the Romans, A.D. 49. By this act of treachery, she gained their favour and increased her own power and wealth. But afterwards, preferring to her husband Venustus, who was esteemed the best warrior among the Britons (Caractacus excepted), his equerry Vellocatus, and advancing him to the partnership of her throne and bed, she occasioned two contending parties; one in favour of Venustus, which maintained his right to the throne, and another which adhered to the interest of Cartismandua. When she found herself likely to be overpowered, she sought the protection and assistance of the Romans, who secured her safety, and in the issue of the contest made themselves masters of the country. Tacitus, Annal. xii. Hist. iii.

CARTMEL, in *Geography*, is a market town of Lancashire, England, seated in a woody vale, near a tract of sands which run out into the Irish Sea. These sands bear the respective names of three rivers, which here discharge themselves into the ocean. To shorten the distance from one place to another many persons travel across these sands, but from the danger that attends these pathless roads, it is found necessary for strangers to employ guides, who are constantly waiting for that purpose. These are employed, and paid, by the government. In the vicinity of the town are some high hills, known by the name of Cartmel Fells. Here was formerly a priory, which was founded by William Mareschall, earl of Pembroke, in the year 1188, for canons regular of the order of St. Austin. The church, which originally belonged to this religious foundation, is appropriated to the parish, and is a large handsome structure. Its tower is very peculiar, being square for some distance from the ground, and the upper part set diagonally within the lower. The interior of the church is fitted up in a very neat style, and contains a number of fine, and ancient monuments. The parish has five chapels of ease, at small places in the vicinity of the town. Here is a free grammar school well endowed, and its buildings were re-erected in 1790. Though Cartmel has no particular manufactories, yet in its vicinity are three very large cotton mills. Here are two weekly markets, Tuesdays and Saturdays; and two annual fairs. Cartmel is 16 miles from Lancaster, and 265 N.W. from London. It contains 140 houses and 882 inhabitants.

About three miles south of the town are *Cartmel Wells*, which are resorted to in the summer season, and their waters are found serviceable in scorbutic complaints. A pleasant walk through the woods of about a mile leads to *Holker Hall*, the seat of lord George A. Cavendish. The mansion is ornamented with several fine pictures by Vandyke, and other masters.

CARTON, or, as we pronounce it, **CARTOON**, in *Painting*, a design made on strong paper, to be afterwards calqued through, and transferred on the fresh plaster of a wall, to be painted in fresco.

CARTON is also used for a design coloured, for working in mosaic, tapestry, &c. The word, in the original French, signifies *thick paper* or *paste-board*.

In Italian, whence the term seems to be derived, *cartone*, or *cartoni*, signifying *large paper*, denotes several sheets of paper pasted on canvas, on which large designs are made, whether coloured or with chalks only. Of these cartoons there are many by Domenichino, Lionardo da Vinci, Andrea Mantegna, Michael Angelo, &c.; but the most celebrated performances of this kind are the "cartoons of Raphael" or Raffaello Sanzio, Da Urbino, which are seven in number, and form only a small part of the sacred historical designs executed by this famous artist, while engaged in the chambers of the Vatican under the auspices of pope Julius II. and Leo X. As soon as they were finished, they were sent to Flanders, to be copied in tapestry, for adorning the pontifical apartments; but the tapestries were not conveyed to Rome till after the decease of Raphael, and probably not before the dreadful sack of that city in 1527 under the pontificate of Clement VII.; when Raphael's scholars having fled from thence, none were left to inquire after the original cartoons, which lay neglected in the store-rooms of the manufactory. The revolution that happened soon after in the Low Countries prevented their being noticed during a period in which works of art were wholly neglected. These seven, however, escaped the wreck of the others, which were torn in pieces, and of which some fragments

ments remain in different collections. These were purchased by Rubens for Charles I., but they had been much injured by the weavers. In this state they also fortunately escaped being sold in the royal collection, by the disproportionate appraisement of these seven at 300*l.* and the nine pieces, which were the triumph of Julius Cæsar by Andrea Mantegna, appraised at 100*l.* The cartoons seem to have been little noticed till king William III. built a gallery for the purpose of receiving them at Hampton-Court. After having suffered much from the damps of the situation in which they were placed, they were removed by order of his present majesty king George III. to the queen's palace at Buckingham-house, and from thence to the castle at Windsor, where they are open to public inspection. These cartoons are justly represented as "the glory of England, and the envy of all other polite nations;" and his majesty is entitled to a tribute of respect and applause for his care in preserving these precious treasures. They have been long deservedly held in high estimation throughout Europe by all authors of refined taste, and by all the admirers of the art of design, for their various and matchless merit, particularly with regard to the invention, and to the noble expression of such a variety of characters, countenances, and attitudes, as they are differently affected and suitably engaged, in every composition. The Abbé du Bos, in his treatise on poetry and painting, has committed a very gross error in his development of one of the characters in this collection. Having described the carton of the miraculous draught of fishes, he points out with propriety the expression of St. Peter, St. John, and other disciples, and then proceeds to illustrate a singular character, which he seems particularly to admire, for the strength and justness of the expression; that figure, according to his opinion, being represented with a confused countenance, and melancholy complexion, and seeming to be devoured by black jealousy, in which person (he says) it is easy to distinguish Judas. Whereas if this ingenious writer had maturely considered the time which Raphael chose for his subject, and which was, as the evangelist informs us, the third time of our lord's appearing to his disciples after his resurrection, and consequently some weeks after the death of Judas, who hanged himself when Christ was condemned; or if he had counted the number of figures in the composition, which is only eleven and our Lord himself, he could never have committed so unaccountable an error, as to imagine that Raphael deserved commendation for being so absurd as to introduce so infamous a wretch, at such a point of time, when Christ was directing his disciples to take care of his flock; or for grouping such a person among the apostles, who, as he was dead before, could not associate with them, and whom they would have avoided, if he had been alive, with abhorrence and detestation. The discernment and judgment of Raphael could not have allowed him to be guilty of so gross an anachronism. "Perhaps the best apology, and the truest (says Pilkington), that can be made for this mistake of Du Bos, is, that he was much more conversant and better acquainted with the works of Raffaello than with the works of the Evangelists. Mr. Fuseli, however, remarks, that Mr. Pilkington has miscalculated the number of the cartoons; as he mentions that which represents the miraculous draught of fishes, and the subsequent one of the donation of the keys, with regard to which Du Bos committed his error, as if they were the same. Pilkington's Dictionary of Painters by Fuseli, art. *Raffaello SANZIO, Da Urbino.*

CARTOUCH, in *Architecture, Sculpture, &c.* denotes an ornament representing a scroll of paper; being usually in form of a table, or flat member, with wavings; whereon is

some inscription, or device, ornament of armory, cypher, or the like. It is nearly akin to a modillion; from which it only differs in this, that the latter is used under the cornice in the eaves of a house, and the former in wain-cotting within doors. Some workmen call the *cartouches* *DENTILS*. The word is French, formed from the Italian *cartoccio*, which signifies the same. Cartouches are sometimes drawn on paper, as in the titles of maps, &c. and are sometimes made of stone, brick, plaster, wood, &c. for buildings.

CARTOUCHES, in *Heraldry*, a name given to a sort of oval shields, much used by the popes and secular princes in Italy, and others, both clergy and laity, for painting or engraving their arms on. Many suppose this form derogatory to the honour of the person; but though the square shield, with the rounded and pointed bottom, is more in use with us, as also with the French and Germans, yet this is supposed more truly the figure of the Roman shield worn by the soldiery, and therefore more ancient and honourable than either that or the indented shield of the Germans.

CARTOUCH, in the *Military Art*, a wooden case about three inches thick at bottom, and girt round with marine, holding two, three, or four hundred musquet balls, with eight or ten iron balls weighing one pound each, to be fired from a mortar, gun, or howitzer, for the defence of a pass, defile, ditch, breach, retrenchment, &c. It ought not to be confounded with the *gargouze*, *gargouche*, or *gargouisse*, which is simply the case or roll of paper, paste-board, parchment, or flannel, &c. filled with the charge of powder necessary for the caliber or bore of the piece or fire arm made use of; whereas the cartouch contains, besides the powder, balls of lead, old nails, chains, pieces of iron, &c. &c., which are put into the piece instead of a bullet, whether on a breach or on a retrenchment, in defending a pass, or against an enemy near to you in battle. Those, who make use of this sort of firing, are said to fire with the cartouch, in French *tirer a cartouche*.

CARTOUCHES, in *Artillery*, are made of leather for slinging over the shoulders of the matrosses; who carry in them the ammunition from the magazines or waggons for the use of the artillery, when they are either at exercise or on actual service.

CARTOUCH de congé absolu, known under the name of *congé d'ancienneté*, or leave of seniority, is a set form of absolute, final, or unlimited leave of absence from military service, inserted on a sheet of paper called or known by the name of *cartouche*, on which are expressed the merits or deserts of the military person, to whom the discharge or *congé absolu* is granted, whether for having finished the time or number of years he was engaged to serve by his contract of enlistment, or on account of the impossibility of his finishing the same through his wounds or infirmities, or for other reasons, that exempt him definitively from service.

CARTOUCH de soldat, *cartouchier*, a cartridge-box, pouch, cartouch. It is a case of light wood covered with leather, with a flap over it of the stoutest blackened calf-skin, sufficiently thick and substantial to bear the wettest and severest weather. The case is considerably longer than broad, and has two rows of holes in it for about 24 musquet-cartridges. As it hangs from a buff cross-belt over the left shoulder, and is worn in that manner by the infantry, before the body of the soldier a little below the right pocket-hole for the purpose of carrying his ammunition, it is made of a form somewhat rounded or circular in order to apply equally every where to his body. It is worn by him in this way upon a belt both on ordinary duty and in the time of action. The flap is generally ornamented with a brass crown, &c. for.

for the battalion-men; a fuse for the grenadiers; and a bugle-horn for the light infantry. The pouches or cartridge-boxes used by the cavalry are smaller than those made use of by the infantry. Cartridge-boxes have often been made of iron, but seldom or ever are now.

CARTRIDGE, in French *gargouze*, *gargouche*, or *gargouffe*, and sometimes, but erroneously, *cartouche*, which signifies not merely the cartridge and charge of powder as the word *gargouffe*, *gargouze*, or *gargouche* does, but the whole charge, consisting of the cartridge and charge of powder with the bullet, grape-shot, case-shot, chain-shot, double-headed shot, nails, pieces of brass or iron, or whatever else is discharged from the piece by the inflammation of the powder. A cartridge, in the ordinary acceptation of the word, is a case or cover holding exactly the charge of powder allotted for any piece, and so fitting the bore of the same as to be rammed home without difficulty. Cartridges have been made of various substances, such as paper, paste-board, parchment, bladders, and flannel. The bottoms of paper-cartridges are apt to remain in the fire-arm or piece, and to accumulate to such a degree as to prevent the priming from reaching the powder, besides which inconvenience they are attended also with others. Paste-board-cartridges are liable to nearly the same objections. The fire shrivels up those made of parchment or bladders in such a manner, that they enter into the vent and become so hard, that the priming iron cannot sufficiently clear it. Nothing has as yet been found to answer better for cartridges than flannel, which is now generally made use of for artillery-ones of all sorts, because as it does not keep or retain fire it is not apt to occasion accidents in loading, which the others frequently used to do. But as the dust of powder passes through them, parchment covers are sometimes made and put over them, which are taken off as they are used. Flannel cartridges, however, may be rendered much more commodious or manageable, and not only a great deal stiffer but also proof against the dust of powder penetrating or passing through them, by boiling the flannel, of which they are made, in size. Without some such precaution to stiffen them, they are so pliable, and when large contain so much powder, that it is with difficulty they are put into the pieces. The loading and firing of guns with cartridges are much quicker and less liable to accidents than with loose powder.

The cartridge for a heavy brass 42 pounder, or an iron 42 pounder for service, used to contain, and does now, 14 lb. of powder; that for a heavy brass 32 pounder used to contain, and does now, 10 lb. 11 oz. of powder; that for an iron 32 pounder used to contain 9 lb. 4 oz. but contains now 10 lb. 11 oz. of powder; that for a heavy brass 24 pounder or iron 24 pounder used to contain, and does now, 8 lb. of powder; that for a heavy brass 18 pounder used to contain, and does now, 6 lb. of powder; that for an iron 18 pounder used to contain 8 lb. but contains now 6 lb. of powder; that for a heavy brass 12 pounder or an iron 12 pounder used to contain, and does now, 4 lb. of powder; that for a heavy brass 9 pounder used to contain 3 lb. of powder, and that for an iron 9 pounder now contains the same weight of powder; that for a heavy brass 6 pounder used to contain 2 lb. 8 oz. of powder, but now contains only 2 lb. of powder; that for an iron 6 pounder used to contain 2 lb. 8 oz. of powder, but now contains only 2 lb. of powder; that for a heavy brass 3 pounder or for an iron 3 pounder used to contain, and does now, 1 lb. of powder; that for a medium brass 24 pounder used to contain, and does now, 8 lb. of powder; that for a medium brass 12 pounder used to contain, and does now, 3 lb. 8 oz. of powder; that for a medium brass 6 pounder used to contain, and does now,

2 lb. of powder; that for a medium brass 3 pounder used to contain the same weight of powder as one for a heavy brass 3 pounder, viz. 1 lb. of powder; and one for a brass 3-pounder, according to general Defaguliers' construction, contains the same charge of powder now; that for a light brass 24 pounder used to contain, and does now, 5 lb. of powder; that for a light brass 12 pounder used to contain, and does now, 3 lb. of powder; that for a light brass 6 pounder used to contain, and does now, 1 lb. 8 oz. of powder; and that for a light brass 3 pounder used to contain 12 oz. of powder, but contains now only 8 oz.

There ought not, strictly speaking, to be fixed or determinate charges for guns of different calibres. But they should vary as to the weights and quantities of the powder with the services, to which the guns themselves are to be applied. And it may with truth be asserted, that the charges of powder usually allotted for cannon are generally greater than what are either proper or necessary for them on any service whatsoever. The best charges even for one and the same piece, when applied to different uses or services, have never as yet been correctly ascertained, or even nearly so.

Ball-cartridges, in French *cartouches*. For the convenience of quick firing, the shot is fixed to the cartridge by means of a wooden bottom or hollowed or cut into on one side as to receive nearly one half of the shot, which is fastened to it by two small slips of tin, which pass or cross over the shot and are fastened to the bottom, to the other side of which the cartridge holding the charge of powder is tied.

The cartridges are likewise fixed in the same manner to the bottoms of grape shot, which are used with field pieces, and are called in French *cartouches a grappes de raisin*.

CARTRIDGE-box. See *CARTOUCHE de soldat*.

CARTWRIGHT, THOMAS, in *Biography*, a learned Puritan divine, was born in Hertfordshire about the year 1535, and admitted into St. John's college in the university of Cambridge in 1550. Such was the assiduity of his application, commenced at college and continued through life, that he allowed himself only five hours of sleep. Upon the death of king Edward VI., he quitted the university, and became clerk to a counsellor at law; but in this situation he prosecuted his former studies with unremitting diligence, at every interval of leisure which occurred. Being afterwards recommended by the gentleman who employed him to Dr. Pilkington, master of St. John's college in Cambridge, he was restored upon giving satisfactory evidence of his abilities and attainments, to that seminary of learning, and in 1560 was chosen fellow of his college. From hence he was removed to Trinity college, and on account of his peculiar merit, made one of the eight senior fellows. When queen Elizabeth visited the university in 1564, Mr. Cartwright was much distinguished; and in 1570 he was chosen lady Margaret's divinity professor. At this time his popularity as a preacher was so great, that when it was his turn to officiate at St. Mary's church, it was necessary to take down the windows for the accommodation of the multitude that attended him. The sentiments concerning church discipline, which he delivered in his lectures, were unfavourable to the established hierarchy, and complaints were preferred against him to sir William Cecil, chancellor of the university, both by archbishop Grindal and Dr. Whitgift, who desired that he and his adherents might be silenced. The chancellor, to whom Cartwright wrote in his own defence, seemed disposed to treat him with moderation; but his adversaries renewed their accusations; and he was cited before the vice chancellor, to give an account of the obnoxious sentiments delivered in his lectures. Incapable of giving satisfaction, he was suspended from his office as a lecturer, and prevented

prevented from obtaining his doctor's degree. In 1571, Dr. Whitgift was appointed vice-chancellor; and by his influence Mr. Cartwright was first deprived of his Margaret-professorship, and afterwards of his fellowship. As danger was apprehended from the dissemination of his principles in the university, he was reduced to the necessity of leaving it and of seeking subsistence in a foreign country. Whilst he was abroad, he formed an acquaintance with the most celebrated divines in several Protestant universities, who treated him with great respect on account of his learning and character; and he was chosen minister to the English merchants first at Antwerp, and afterwards at Middleburg, where he continued two years. His friends in England, however, were anxious for his return to his own country, and he at length yielded to their importunity. Upon his return he found that the prosecution against the Puritans continued with unabated violence; and though the authors of a piece in their favour, entitled "An Admonition to the Parliament," had been committed to Newgate in 1572, Mr. Cartwright wrote "A second Admonition to the Parliament," which involved him in a controversy with Dr. Whitgift, that obliged him to leave the kingdom, whilst it was the means of advancing his opponent to the bishopric of Worcester. During an absence from his country of five years, he officiated in some of the English factories; and in 1580, James VI., king of Scotland, having an high opinion of his abilities, and learning, offered him a professorship in the university of St. Andrew's, which he thought proper to decline. Upon his return to England, he was arrested as a promoter of sedition, and thrown into prison; but being liberated by the interest of the lord treasurer Burleigh, and the earl of Leicester, the latter conferred upon him the post of master of the Hospital, which he had founded in Warwick. In compliance with the solicitations of several learned friends at home and abroad, he undertook to write against the Rhemish translation of the New Testament; but some time after he had commenced the work, archbishop Whitgift, by an arbitrary and unjust mandate, prohibited his prosecution of it; the performance, however, was nearly completed; and was published some years after his death. In 1585 some new complaint was alleged against him, and he was committed to prison by Dr. Aylmer, bishop of London; and again in 1591, the same prelate ordered him to be lodged in the Fleet, where he was kept in a very close and rigorous confinement. Many applications were made on his behalf, but they were ineffectual till about the middle of the year 1592, when he was released, restored to his mastership of the hospital at Warwick, and permitted to preach. Towards the close of his life, the zeal with which he had, in the earlier period of it, opposed the church, was somewhat abated, and he seems to have lived on terms of friendship with archbishop Whitgift, who used him kindly and tolerated his preaching at Warwick. Long confinement and application to study had much impaired his health; and at length terminated his life in December, 1603, in his 68th year. In his private character, he was pious, disinterested, and charitable; and though the persecution against him was harsh and severe, it originated with that contest for superiority, which the intolerant principles of each party would lead them to abuse, and therefore demands some kind of apology from the candour of more enlightened and liberal times. Besides the works already mentioned, Cartwright wrote "Commentaria practica in totam Historiam evangelicam," 4to. 1630; reprinted at Amsterdam in 1647; "Commentarii succinctorum et dilucidi in Proverbia Salomonis," 4to. Amlt. 1638; "Metaphrasis et Homiliæ in librum Salomonis, qui inscribitur Ecclesiastes," 4to. Amlt. 1647; "A

Directory of Church-government," 4to. 1644; and "A Body of Divinity," 4to. Lond. 1616. Biog. Brit.

CARTWRIGHT, WILLIAM, a poet and divine of the 17th century, was born in 1611 at Northway, near Tewksbury, in Gloucestershire, educated at Westminster school, and elected a student of Christ-church in Oxford, in 1628. Having gone through the usual course of studies, he took orders, and became, as Anthony Wood expresses it, "a most florid and seraphical preacher" in the university; where he performed the office of junior proctor, and also that of metaphysical reader. His poetical pursuits amused him in the course of these graver studies, and procured for him unbounded applause. But a malignant fever closed his career in his 33d year, December 1643. The king and queen, being at this time in Oxford, testified their respect for him, by their inquiries during his illness, and his majesty wore black on the day of his funeral. Mr. Cartwright was much distinguished both by external and internal endowments, and few persons shared a greater degree of attention and applause. Four plays, and some other poems, comprised in one volume, and prefaced by about 50 copies of commendatory verses, by the university wits, are the principal production on which our author's fame was founded. But his popularity does not seem to have been very extensive or durable; as only one edition of his works was published, and that is at present very little known. He is also said to have written some Latin and Greek poems, a "Passion sermon," and two or three occasional poems. Biog. Brit.

CARVA, in *Botany*, a name given by the Indians to one of the kinds of cinnamon-tree. This is of all others the most esteemed amongst them, and serves for the greatest number of purposes. They extract camphor and liquid oil from the roots; they extract oil of cinnamon from the bark, and from the leaves they make another oil, which is called oil of cloves, and sold as such. The fruits yield them an oil resembling that of juniper, and afterwards they extract from them a thick, fat substance, like wax, serving them for the making of unguents and plasters, and also for the making of their candles.

CARVAGE, *carvagium*, the same with CARRUCAGE.

Henry III. is said to have taken carvage, that is, two marks of silver of every knight's fee, towards the marriage of his sister Isabella to the emperor.

Carvage could only be imposed on the tenants *in capite*.

CARVAGE also denotes a privilege whereby a man is exempted from the service of *carrucage*.

CARVALHAL, in *Geography*, a town of Portugal, in the province of Beira; five leagues S.E. of Porto.

CARVALHO, a town of Portugal, in the province of Beira; four leagues S.E. of Coimbra.

CARVALHO D' ACOSTA, ANTONY, in *Biography*, was born at Lisbon in 1650; and having devoted his life to the study of the mathematics, astronomy, and hydrography, undertook to give a topographical description of his country: with this view he traversed the whole country, following the course of its rivers and crossing its mountains. The result of his investigation is the best work on the subject, contained in three volumes fol. which appeared between the years 1706 and 1712. It comprises also the history of the principal places, the illustrious men to which they have given birth, their natural curiosities, &c. He also wrote an abridgment of geography, and a method of astronomy. He died in 1715 in such a state of indigence, that he did not leave enough to pay the charges of his funeral. Nouv. Dict. Hist.

CARVANCAS, in *Ancient Geography*, a mountain mentioned by Ptolemy, which terminated Norica, and also Pannonia to the west.

C A R

CARVANIS, a town of Cappadocia, placed by Ptolemy in the Pontus Polemoniacus; probably the *Carbanis* of Steph. Byz. and Cedrenus.

CARUCATARIUS, in *Ancient Law Books*, he that held land in soccage, or by plough tenure.

CARRUCATE. See **CARRUCATE**.

CARUE, in *Rural Economy*, a term signifying the fouring of any sort of fluid: thus, to *carue* implies to grow four, and is generally applied to cream.

CARVEL, in *Ship-building*. When the edges of the planks are towards each other, the vessel is said to be *carvel-built*, in contradistinction to *clinker* or *clinker-built*, where the edges of the planks over lap each other.

CARVEL of *St. Thomas*, in *Geography*, a rock situate between the Virgin isles E. and Porto Rico on the W. At a small distance it appears like a sail, as it is white, and has two points. Between it and St. Thomas, passes Sir Francis Drake's channel.

CARVENDONCK, a town of Germany, in the circle of Westphalia, and duchy of Cleves; eight miles S.S.E. of Cleves.

CARVENTUS, in *Ancient Geography*, a town of Italy. in Latium. Steph. Byz. Livy, lib. IV. c. 53.

CARVER, a cutter of figures or other devices in wood. See **CARVING**.

Carvers answer to what the Romans called *sculptores*, who were different from *calatores*, or engravers, as these last wrought in metal.

CARVER is also an officer of the table, whose business is to cut up the meat, and distribute it to the guests. The word is formed from the Latin *carptor*, which signifies the same. The Romans also called him *carpus*, sometimes *scissor*, *scindendi magister*, and *structor*.

In the great families at Rome, the carver was an office of some figure. There were masters to teach them the art regularly, by means of figures of animals cut in wood. The Greeks also had their carvers, called *diatetai*, q. d. *deribitores*, or *distributores*. In the primitive times, the master of the feast carved for all his guests. Thus in Homer, when Agamemnon's ambassadors were entertained at Achilles's table, the hero himself carved the meat. Of later times, the same office on solemn occasions was executed by some of the chief men of Sparta. Some derive the custom of distributing to every guest his portion, from those early ages when the Greeks first left off feeding on acorns, and learned the use of corn. The new diet was so great a delicacy, that to prevent the guests from quarrelling about it, it was found necessary to make a fair distribution. Athen. Deipn. lib. i. cap. 10. Potter. Arch. lib. iv. cap. 10.

In Scotland the king has an hereditary carver in the family of Anstruther.

CARVER, in *Geography*, a township of America, in the state of Massachusetts and county of Plymouth. Here is a pond containing such quantities of iron-ore, that 500 tons have been taken out of the clear water in a year. Upon the stream which runs from the pond is a furnace; and the iron made of this ore is better than that made of bog ore, and some of it is as good as refined iron.

CARVER'S river, a branch of St. Peter's river, which discharges itself into the Mississippi. See **St. PIERRE**.

CARUGNA, in *Geography*, a town of Piedmont, in the marquisate of Ivrea; 8 miles S.W. of Jurea.

CARUL, in *Botany*, pratenae officinarum. Bauh. pin. 158. (Tournef. Cl. 7. gen. 4.) See **CARUM Carui**.

CARUL, *foliis tenuissimis*; Tourn. See **SISON verticillatum**. **CARUL alpina**; Bauh. pin. See **SESELI Pyrenæum**.

CARULIFOLIA, Bauh. pin. Villars. See **SELINUM caruifolia**.

C A R

CARVILLAN, in *Geography*, a small island near the W. coast of Scotland, a little to the N. of the island of Gigo.

CARVIN-ESPINOY, a town of France, in the department of the straits of Calais, and chief place of a canton, in the district of Bethune; 4 leagues E. of Bethune. The place contains 4920, and the canton 14,807 inhabitants; the territory includes 90 kilometers and 11 communes.

CARVING, in a general sense, the art or act of cutting or fashioning a hard body by means of some sharp instrument, especially a chisel. In which sense, carving includes statuary and engraving, as well as cutting in wood.

CARVING, in a more particular sense, is the art of engraving or cutting figures in wood. In this sense, carving, according to Pliny, is prior both to statuary and painting. See **CUTTING in wood**.

CARVIST, in *Falconry*. See **FALCON**.

CARULA, in *Ancient Geography*, a town of Spain, in Bætica, between Basilippo and Ilija, according to the Antonine Itinerary, supposed to be the present *Villa-Nuevo-del-Rio*.

CARUM, in *Botany*. (Said to derive its name from Caria, in Asia Minor, where the original species grows abundantly.) Linn. gen. 365. Schreb. 497. Willd. 561. Juss. 219. Gært. 125. Class and order, *pentandria digynia*. Nat. ord. *Umbellatae*, Linn. *Umbelliferae*, Juss.

Gen. Ch. Cal. *Umbel universal*, long; rays ten or more, often unequal; *umbel partial*, crowded; *involucre universal*, often monophyllous; perianth scarcely manifest. *Cor. universal*, uniform; florets of the disk frequently abortive. *Cor. proper* unequal; petals five, unequal, obtuse, keeled, inflex-emarginate. *Stam.* Filaments five. capillary, length of the corolla, caducous; anthers roundish, very small. *Pist.* germ inferior; styles two, very small; stigmas simple. *Peric.* none; fruit ovate-oblong, striated, divisible into two. *Seeds* two, convex on one side, flat on the other.

Eff. Ch. *Fruit* ovate-oblong, striated, general involucre most commonly monophyllous. *Petals* keeled, inflexed, emarginate.

Sp. 1. *C. carui*, caraway. Linn. Sp. Pl. Mart. Willd. 1. Woodville. Med. bot. pl. 45. Eng Bot. 1503. (Seseli Carum. Scop. Lam. Villars. Apium. Crantz. Ligusticum carui; Roth Germ.) "Stem branched; sheaths of the leaves distended; partial involucre, most commonly none. Willd. *Root* spindle-shaped, biennial. *Stem* about two feet high, angular, furrowed, smooth. *Leaves* smooth, doubly pinnate; cut into linear narrow segments, the lowermost of which cross each other. *Umbels* numerous, terminal, upright. *General involucre* of one, two, or three small, narrow, entire leaves; *partial one* almost always none.

Petals nearly uniform, white or very pale flesh-coloured, inflexed so as to become heart-shaped; calyx entire. The central flowers only fertile, according to Dr. Smith; but Linnæus describes the flowers of the disk as being sometimes abortive, and Dr. Withering asserts that they are all fertile. *Fruit* small, oblong, striated, each seed almost cylindrical. Dr. Smith. The seeds are well known to have a pleasant spicy smell, and a warm aromatic taste; and on that account they are a common ingredient in cakes, and are encrusted in sugar for comfits; they are also distilled with spiritous liquors to improve their flavour. The tender leaves in the spring are boiled in soups; and the roots are said by Parkinson to be better eating than parsnips. The seeds are esteemed to be carminative, cordial and stomachic, and recommended in dyspepsia, flatulencies, and other symptoms attending hysterical and hypochondriacal disorders; they are also reported to be diuretic and to promote the secretion of milk.

An essential oil and a distilled spirit are directed to be prepared from them by the London college. They give out the whole of their virtues by moderate digestion, to rectified spirit. Watery infusions are stronger in smell than the vinous tincture, but weaker in taste. In distillation or evaporation, water elevates all their aromatic part; the remaining extract is almost insipid, and thus discovers that there is in them less of a bitterish or ungrateful matter joined to the aromatic than in most of the other warm European seeds. Along with the aqueous fluid there arises in distillation an essential oil in the proportion of about one ounce from thirty, which is hotter in taste and more pungent than that obtained from most of our other warm seeds. Woodville. A native of many countries in the northern part of Europe. In England it is found apparently wild, but, as Dr. Smith thinks, only accidentally naturalized, in Bedfordshire, Cambridgeshire, Suffolk, Norfolk, Lincolnshire and Yorkshire. On the banks of the Humber, near Hull, it is so abundant, that great quantities of the seeds are collected every year by the poor people and sold to the apothecaries and confectioners. It is cultivated in several counties, particularly in Essex; and in others, intermingled with coriander and teasels. Twelve pounds of caraway, ten of coriander, and twelve of teasels, are a proper quantity for one acre. They require fresh land which has lain long in pasture, and a soil consisting of a strong clayey loam. The pasture should be ploughed, sowed, and harrowed about the beginning of March. In about ten weeks the plants will be strong enough to bear hoeing, which should be repeated three times in the course of the summer. The coriander being annual will be fit to cut about the beginning of July, and is threshed in the field on a cloth in the manner of rape seed. The ground should be hoed again in the succeeding April and June, and needs no other culture; the caraway will be ready in the beginning of July, and the teasels about the middle of September. Mart. Miller. 2. *C. simplex*, Willd. 2. "Stem quite simple; sheaths of the leaves pressed close to the stem; partial involucre of many leaves." Stem half a foot high, erect, terminated by a solitary umbel. Leaves resembling those of the preceding species, but smaller and narrower; sheaths striated, not dilated, only slightly membranous at their edges. Umbel consisting of from thirteen to fifteen unequal rays; partial umbels capitate. Leaflets of the partial involucre bristle-shaped, unequal, numerous. Flowers white, small. A native of Siberia.

CARUM foliolis setaceis verticillatis; Sauv. mons. See *Sison verticillatum*.

CARUM bunias, Syst. nat. 12. Jacq. tab. 198. Gouan. illus. 20. See *ÆTHUSA Bunias*.

CARUNCULA, **CARUNCLE**, a term in *Anatomy*, properly signifying a little piece of flesh, being a diminutive of the Latin *caro*, flesh.

The name *caruncula* is applied to several parts of the body.

CARUNCULA, or **CARUNCLE**, in *Surgery*, a kind of warty excrescence, or fleshy substance; which the older surgeons supposed to be a very frequent cause of obstruction in the urinary canal, and particularly in those cases usually denominated *Strictures* of the urethra. See **BOUGIES** and **STRICTURE**. Mr. Hunter, and several other practitioners, have of late ascertained, by actual dissections after death, that patients who have such strictures are very rarely affected with caruncles; and, indeed, that they are scarcely ever found, except a short way within the urethra.

CARUNCULA lacrymalis, in *Anatomy*, a small prominence in the inner angle of the eye, between the two eyelids. See **EYE**.

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CARUNCULÆ myrtiformes, some small fleshy excrescences, varying in size and number, which are found at the orifice of the vagina, after the rupture of the hymen. See **GENERATION**, *organs of*.

CARVO, or **CARVONIS**, in *Ancient Geography*, a place of Belgic Gaul, between Mannaricium and Harenatium, according to the Itinerary of Antonine; placed by M. d'Anville on the left of the Rhine, N.E. of Noviomagus.

CARURA, a town of India, placed by Ptolemy on this side of the Ganges.

CARURA, a village of Asia Minor, near the Meander, where they had lodging-houses for the accommodation of strangers, and a number of hot springs. It served as a boundary between Phrygia and Caria. Strabo.

CARURA, *Kauri*, a royal town of India, in the interior of the country called Limyrica, according to Ptolemy; situated about 15 leagues from the sea, S.S.E. of Tyndis and N.E. of Muziris.

CARURA, or **ORTOSPANA**, a place of Arachosia, at the foot of mount Paropamisus; from which place Alexander set out on his entrance into India. It was situated below the source of a small river, which flowed into the lake Arachotus.

CARUS, in *Biography*, a Roman emperor, was born at Narbonne in Illyricum, confounded by Eutropius with the more famous city of that name in Gaul, his father probably being an African, and his mother a noble Roman; and thus the different opinions with respect to his origin have been conciliated. He was educated in the capital, and gloried in the title of Roman citizen. His merit advanced him through a gradation of civil and military honours to the rank of pretorian prefect under the emperor Probus, by whom he was so much esteemed that he wrote to the senate to order an equestrian statue to be erected to him, and a house to be built for him at the expence of the state. Upon the murder of that prince by his mutinous soldiers, A.D. 282, Carus, being about 60 years of age, was unanimously elected by the soldiers, or publicly acknowledged, if, as some have supposed, he was named emperor before the death of Probus. Having notified his election to the senate, without soliciting their confirmation of it, he began his reign by punishing the assassins of his predecessor, though he could not escape the suspicion of being accessory to a deed from which he derived the principal advantage. The next measure of his government was the investiture of his two sons with a share of the imperial power, with the title of Cæsar. See **CARINUS**. He then proceeded against the Sarmatians, who had made an incursion into Illyricum, and defeated them with a great slaughter; 16,000 of them remaining dead on the field of battle, and 20,000 being taken captives. In the beginning of the year 283 he pursued his march, accompanied by his son Numerian, in the midst of winter, through the countries of Thrace and Asia Minor to the confines of the Persian monarchy. Here, without assuming any ensigns of imperial dignity, except a coarse woollen garment of purple, but seating himself on the grass, with a piece of stale bacon and a few hard peas for his supper, he gave audience to the Persian ambassadors. In the interview he took off a cap which covered his baldness, and assured the ambassadors, that unless their master acknowledged the superiority of Rome, he would speedily render Persia as naked of trees as his own head was destitute of hair. These declarations were not impotent menaces; for he ravaged Mesopotamia, made himself master of the great cities of Seleucia and Ctesiphon, and carried his victorious arms beyond the Tigris. His career, however, was suddenly interrupted by a premature death, attended with circumstances which rendered it extraordinary. When he

was confined by sickness to his bed, a furious tempest arose in the camp, accompanied with singular darkness, and incessant flashes of lightning, and a loud clap of thunder was succeeded by a sudden cry that the emperor was dead. It soon appeared that his chamberlains, in the paroxysm of their grief, had set fire to the royal pavilion, and hence a report originated that Carus was killed by lightning; when in truth he died of the disorder with which he had been seized. Such is the account given by his own secretary to the prefect of the city. Arrius Aper, the pretorian prefect, is accused by Vopiscus with having occasioned this catastrophe, and as he afterwards contrived the murder of Numerian, and the emperor's tent was set on fire, the suspicion against him is confirmed. The death of Carus happened in the close of the year 283 after a reign of 16 or 17 months. His temper was haughty, and his manners harsh and intractable; however he was flattered by an eclogue on his accession to the throne, and after his death ranked among the gods. Carus and his two sons bore the names of Marcus Aurelius. Crevier's Hist. of the Emperors, vol. ix. Gibbon's Hist. vol. ii.

CARUS, in *Medicine*, a disease which, according to the definitions of Sauvages, and some other nosologists, differs from apoplexy only in the absence of the stertorous noise in breathing, and in the sopor (or morbid sleep) being somewhat less profound. It is properly considered by Dr. Cullen as a minor degree of apoplexy. (Synops. Nosol. Meth. p. 184.) See APOPLEXY.

CARUSA, in *Ancient Geography*, a town of Asia Minor, in Paphlagonia, seated on the Euxine sea. Scylax calls it *Carussa*, and says that it was a Greek city, between the river Halys and the town of Sinope. Ptolemy calls it *Carissa*.

CARWAITEN, or CRAWATTEN, in *Geography*, a town or rather village of Prussia, in the country of Samland, belonging to the government of Memel, the inhabitants of which subsist by fishing; 44 miles N. of Königsberg.

CARWAR, a maritime town of Hindoostan, situate on the coast of Malabar, between Meerzaw, or Mershee, and cape Ramas in the neighbourhood of Goa, where the East India company have a factory; but better known to the English in the early period of their India trade, and before they were in possession of Bombay. The valleys about it supply plenty of corn and pepper of an excellent kind. The woods on the mountains abound with quadrupeds, such as wolves, monkeys, wild hogs, deer, elks, and beeves of a prodigious size. It is distant about 40 miles S.E. from Goa. N. lat. 15° E. long. 74° 10'.

CARY, Lucius, in *Biography*, viscount Falkland, was the son of Henry viscount Falkland, and lord deputy of Ireland in the reign of king James I.; and born, probably at Burford in Oxfordshire, about the year 1610. Being removed at an early period to Ireland, he received part of his education at Trinity college in Dublin, and completed it at St. John's college in Cambridge. In his youth he was chargeable with some irregularities; but before he had attained the age of 20 years, he came into possession of a large and independent fortune, that had descended to him in consequence of the gift of a grandfather, and he terminated his career of dissipation by marrying a young lady of distinguished accomplishments but small fortune, whom he passionately loved. In forming this connexion he gave great offence to his father, who had entertained hopes of amending his own circumstances by his son's marriage; and though he made ample concessions, and even offered to surrender his whole estate to the disposal of his father, and to depend wholly on his kindness for a subsistence, his father remained unrelenting

and irreconcilable. Distressed by this circumstance, he determined to leave England; and accordingly he removed, with his wife, to Holland, where it was his intention to purchase some military command; but failing to accomplish this object, he returned to his own country, where he lived in retirement and prosecuted his studies, with uncommon assiduity and ardour, maintaining at the same time an intercourse with some of the best scholars of that age. In a very short time he is said to have made himself perfect master of the Greek tongue, and to have read with an accurate attention all the Greek historians. Before he was 23 years of age, he had perused all the Greek and Latin fathers; he also made himself acquainted with all books, which he procured at a great expence from different countries; he likewise diligently studied ecclesiastical and theological controversies; and his memory is said to have been so retentive, that he remembered, on all occasions, whatsoever he read. In some of his poetical attempts he was so successful as to have gained the esteem and admiration of the most eminent poets of his time. About the time of his father's death, in 1633, he was made one of the gentlemen of his majesty's privy chamber; but he still indulged his passion for a rural and studious life, and frequently retired to his seat near Burford, which by the visits of literary men from the neighbouring university was a kind of academy. Here Chillingworth wrote his admirable work against popery, deriving assistance in the composition of it from the suggestions of his lordship. In this retreat various questions of literature, morals, and theology were freely discussed; and here lord Falkland himself, whilst he was entitled to pre-eminence on account of his extensive literature, blended with it that modesty and candour, and sweetness of temper, which commanded the admiration and esteem of his learned visitants, no less than his distinguished abilities and attainments. His habits, however, were not formed in this literary retreat for those public scenes in which he afterwards engaged. In 1639 lord Falkland joined the expedition against the Scots; and in 1640 he was chosen member of the House of Commons for Newport in the Isle of Wight; his peerage, being Scotch, not entitling him to a seat in the House of Lords. By his attendance on the debates of the house, he acquired a high degree of veneration for the authority of parliament; and he was so rigid an observer of established laws and rules, that he thought no mischief so intolerable, as the presumption of ministers of state in breaking positive rules for reasons of state, or of judges in transgressing known laws, upon the plea of convenience or necessity. Accordingly he was more severe than his natural gentleness of temper allowed in other cases, against lord Finch and the earl of Strafford; and he had conceived such a dislike to archbishop Laud, and some other bishops, that he concurred in the first bill for depriving them of the right of voting in the House of Lords. Hence some persons were led erroneously to conclude that he was no friend to the established government of the church; whereas on subsequent occasions, when he began to suspect the designs of the parliamentary leaders, he opposed the same measure to the utmost of his power. For some time he continued averse from the court, and manifested even a moroseness to courtiers; but at length he was prevailed upon to accept a seat in the privy-council, and the office of secretary of state. But he was unfit for stations of this kind, as he was totally unacquainted with the forms of business, and as he was actuated by scruples which impeded the prosecution of it. He would not agree either to the employment of spies, or to the opening of suspected letters. When the breach between the king and parliament came to a crisis, lord Falkland took a decided, firm, and active part with his

matter; and attended him, with considerable danger to himself, at Edge-hill fight, at Oxford, and at the siege of Gloucester. During his residence at Oxford, a circumstance occurred which we shall here recite. When his majesty visited the library, he was shewn, among other books, a Virgil elegantly printed and bound; and lord Falkland, desirous of amusing him, besought him to try his fortune by that mode of divination which was called *Sortes Virgilianæ*. When the king opened the book, the passage which presented itself was part of Dido's imprecation against Æneas (l. iv. v. 615, &c.), thus translated by Dryden:

"Oppress'd with numbers in th' unequal field,
His men discourag'd, and himself expell'd,
Let him for succour sue from place to place,
Torn from his subjects, and his son's embrace, &c."

The king's mind seemed to be impressed by this accident; and, therefore, lord Falkland, hoping for a more favourable occurrence, determined to try his own fortune in the same way; but the passage which chance presented him was more suited to his own destiny than the other had been to the king's. It was the following exclamation of Evander upon the untimely death of his son Pallas (*Æneid*, lib. xi. v. 152, &c.), thus rendered by Dryden:

"O Pallas! thou hast fail'd thy plighted word,
To fight with caution, not to tempt the sword:
I warn'd thee, but in vain; for well I knew,
What perils youthful ardour would pursue;
That boiling blood would carry thee too far,
Young as thou wert in dangers, raw to war!
O curst essay of arms, disastrous doom,
Prelude of bloody fields, and fights to come."

When lord Falkland perceived the calamities that were impending over his country, his spirits sunk; he lost the gaiety and sociableness of his temper, became negligent of his dress and appearance, reserved and morose, and indicated a mind dissatisfied with itself and the world. While sitting among his friends he would frequently, after long silence and deep sighs, with a shrill voice repeat the words "peace," "peace," and declare himself incapable of living in such a state of perpetual grief and anxiety. The closing scene proves almost a determination to throw away that life which was become a burden. Although possessing no military command, he resolved to be present at the first battle of Newbury, fought September 20th, 1643; and in the morning called for clean linen, that if he were slain his body might appear with decorum. Having put himself in the first rank of lord Byron's regiment, he received a musket shot in his belly, and fell from his horse. His body was not found till the next day. Such was the fate of lord Falkland, in the 34th year of his age; generally esteemed as the most virtuous public character, in a period fertile of virtue. His praises have been refounded by poets, historians, and moralists, and are, as it were, interwoven with English literature. His fame perhaps owes most to his intimate friend lord Clarendon, who has drawn an elaborate character of him, and in some respects makes him the moral hero of his history. Lord Falkland left behind him some poems, and various speeches and pamphlets on political and theological topics. *Biog. Brit. Gen. Biog.*

CARY, ROBERT, a learned chronologer, was born at Cochinton, in Devonshire, about the year 1615. He finished his education at Oxford, whither he went in 1631, and where he took his degrees, and was created doctor of laws in 1644. He travelled into foreign parts, and on his return was presented with the rectory of Portlemouth, near Kingsbridge, in Devonshire. During the troubles he joined the Presbyterian party, but upon the restoration of

Charles II. he was one of the first who congratulated him on his return, and was soon after preferred to the archdeaconry of Exeter. But after about two years he was ejected, in 1664, and retired to his rectory, where he passed the remainder of his life with reputation, and died in September 1688. He published his "*Palælogia Chronica, or a chronological Account of ancient Times, in three parts, 1. Didactical, 2. Apodeictical, 3. Canonical*," Lond. 1677, fol. Of this book we have an account in the *Philosophical Transactions*, N° cxxxii. p. 808. He was, in his younger years, skilled in poetry, both Latin and English; but his only publication of this kind was those hymns of our church which are appointed to be read after the lessons, together with the creed, &c. They were translated by him into Latin verse. *Biog. Brit.*

CARY, in *Geography*, the name of a small river in the county of Antrim, Ireland, which uniting with some other mountain streams falls into the North Channel, at Ballycastle.

CARY, the northern barony of the county of Antrim, Ireland, opposite to the Island of Rathlin, and remarkable for the Basaltic region, of which the Giant's Causeway is a part. It was anciently called the *Route*, or *Root*, and was taken possession of by the clan of McDonalds from the Hebrides, some time previous to what has been called the *plantation of Ulster*, in the reign of James I. The barony received its present name from a castle now in ruins. Some old maps have also a cape marked Cas-Cary, which must be what is now called Tor-point. *Hamilton's Antrim.*

CARY Bay, a large bay on the south coast of Cornwall, round the point of the Deadman to the westward, and extending almost to the eastern point of the entrance into Fal-mouth haven.

CARYA, in *Ancient Geography*, a country of the Peloponnese, in Laconia, the capital of which was of the same name. Vitruvius mentions the destruction of this city, because it united with the Persians, who were enemies to the Greeks. The male inhabitants were put to the sword, and its females were made captives. Pausanias says, (*Lacon. l. iii. c. 10. p. 230.*) that it had a temple of Diana Caryatis, and a statue of that goddess in the open air. It was situated on the banks of the river Cænus, a little to the west of Glympes. See CARYATES and CARYATIDES.

CARYA. See CARIA.

CARYANDA, an island of Asia Minor, in the Mediterranean, on the coast of Caria. Pliny.—Aliso, a town of Asia Minor, in Caria. Steph. Byz. says, that it was a seaport, near Miusus and Cos. Scylax, who was of this city, says, that Caryanda was an island, town, and port. It has since been called *Caracivon*.

CARYATES, in *Antiquity*, a festival in honour of Diana, surnamed Caryatis, held at Caryum, or Carya, a city of Laconia. The chief ceremony was a certain dance, said to have been invented by Castor and Pollux, and performed by the virgins of the place.

During Xerxes's invasion, the Laconians not daring to appear and celebrate the customary solemnity, to prevent incurring the anger of the goddess by such an intermission, the neighbouring swains are said to have assembled and sung pastorals, or *bucolismi*, which are said to have been the origin of bucolic poetry.

CARYATIDES, in *Architecture*. Besides columns and pillars, statues of various kinds have been employed by architects for the same purposes. Female figures of this nature clothed in long garments were called by the Greeks Caryatides, the reason of which is thus explained by Vitruvius, lib. i. The inhabitants of Carya, a city of the Peloponnese,

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fus, having joined with the Persians against the Grecian states, and the Greeks having terminated the war by a glorious victory, with one consent commenced hostilities against the Caryates. They took the city, destroyed it, put all the males to the sword, and carried the females into captivity; and to treat them with still greater ignominy, forbade them to divest themselves of their robes, or any of their ornaments, that so they might not only be once led in triumph, but in a manner suffer the same mortification all their lives by constantly appearing in the same dress as on the triumphal day. And further, as an everlasting testimony of the crime of the Caryates, the architects of that time employed the representations of these women to support the entablatures of their public buildings.

Vitruvius proceeds to inform us, that the Lacedæmonians, after the battle of Platea, erected with the spoils and plunder the Persian portico, as a trophy, to transmit to posterity the valour and honour of the citizens; introducing therein the statues of the captives, adorned with habits in the barbarian manner, supporting the roof. Thus, with merited infamy they punished pride, terrified their enemies with the idea of their power, and the citizens beholding this monument of their courage, were inspired with a love of glory, and became more animated in the defence of their liberty. Hence it is, that many introduce Persian statues sustaining the entablature, and thus make an excellent variety in their works.

The Greeks and Romans had also two other denominations for these figures, derived from their action of carrying or supporting, *Atlantes* and *Telamones*. Caryatides, however, has become by modern usage a generic term for these statue-columns, and we shall accordingly under this article take a general view of the subject.

From the history related by Vitruvius we might be led to suppose that the Greeks were the inventors of this order, if it may be so called: they were not, however, the first, though it is not improbable that in different countries, without communication with each other, the love of allegory, religious or political motives, or the mere caprice of ornament, may have transformed columns into statues.

That the Egyptians had adopted this manner appears from some remains, from the testimony of authors, and from the nature of their sculpture. Among the ruins of the Memnonium, at Thebes, there is a portico with figures engaged in the pilasters supporting the entablature: these statues have the lituus in one hand and the flagellum or scourge in the other, as commonly seen in the statues of Osiris. Among the figures given by Denon there is a curious kind of frieze composed of truncated human figures, which, with their heads and one elbow lifted up, support the cornice. Diodorus Siculus in describing the sepulchre of Osymanduas, gives an account of a peristyle four hundred feet square, which instead of pillars was adorned with animals, each of a single stone, and four and twenty feet high, executed after the ancient manner, and it was covered with stones twelve feet long, the ceiling being painted azure, and ornamented with stars. We are not informed what kind of animals these were, or what was their attitude; perhaps they were sphinxes, which instead of being in the usual crouched posture of those commonly seen, which were placed at the entrance of the temples, were in a sitting attitude in the manner of the Athenian lions preserved at Venice. At least this seems the only position in which similar supports could be placed to have the required height and necessary solidity. The same historian relates that Psammeticus erected a peristyle at Memphis, to which colossal statues of eighteen feet high served for pillars.

Sculpture appears to have been in Egypt entirely subordinate and subservient to architecture, an art which had no motive but religion, no object but the decoration of its edifices; whether it led up to the temple gate the long avenue of sphinxes, emblems of the mystery which overshadowed its walls or seated in sublime tranquillity, the colossal effigies of its gods; or inscribed in countless hieroglyphics its secret doctrines and exclusive knowledge.

When we consider the nature of the Egyptian statues and the timidity of the artists who never separated the legs, and generally attached the figure behind to a square slab or pilaster reserved out of the block, we shall not be surprised that independently of any religious motives which might lead to the use of Caryatides, the idea should originate of employing for the support of buildings statues which did not yield in real solidity and apparent strength to any species of columns. If also we consider the style of sculpture, its rigid symmetry of attitude and motionless inflexibility of appearance, we must allow that no statues were better adapted to take the place of columns, and no where were the objections which may be urged against the use of Caryatides less founded. Accordingly, it seems probable that no where was this custom more prevalent than in Egypt.

We may perhaps form the best idea of the Egyptian Caryatides from those which at present support the entablature of the great door of the Museum Vaticanum. These statues were found in the villa of Adrian, and were probably among those which that emperor, so desirous of imitating Egyptian customs, caused to be made in the manner of those which existed in Egypt. They are eleven feet in height, including the plinth. The capitals which rise above their heads are of the bell shape so commonly observed in the Egyptian remains. The appearance of these Caryatides is singularly grand, in spite of all the incongruities of their situation and of the details of the architecture which accompanies them.

The Hindoo excavations in the mountains of Ellora near Aurungabad in the Decan; works of whose origin history has preserved no memorial, but whose stupendous execution ranks them among the wonders of human labour, may be cited among the instances of the use of Caryatides. In one of these the Kailasa, or paradise of the gods, a monument which presents the appearance of a vast and elaborate building, standing in a considerable area, the whole of which is excavated in the granite rock; the basement of this astonishing edifice is sculptured with the figures of elephants and lions, giving the whole mighty mass the appearance of mobility by these powerful animals. The excavated rocks of Mauveliporam offer singular pillars, each being composed of the figure of a lion sitting on a double plinth, forming the lower part of the shaft, which rising octagonally and tapering, terminates in a capital consisting of three horsemen, which support the entablature. In one of the excavated temples on the island of Salfette, there are capitals well executed, and composed chiefly of elephants, to which, in some instances, are added horses and human figures. In Jaganatha Sabha, another of the excavations of Ellora, the pillars rest upon elephants. Daniell's Antiquities of India and Hindoo excavations.

The description of the temple of Jerusalem preserves some traces of this custom. Hiram's molten sea was supported by twelve bulls, and on the walls of the oracle he placed alternate cherubim and palm trees, supporting wreaths of flowers, and probably the ceiling.

In the ruins of Persepolis also, there remain some capitals consisting of horses and camels. And in geographical, though not in chronological order, we may mention some instances

CARYATIDES.

instances at Palmyra. The colossal cornice of the great temple has modillions in the form of bulls and lions, supporting the corona, and in more than one example statues of genii are used to sustain a kind of projecting balcony in the singular tower-shaped mausoleums which are found there.

Though however the idea of employing Caryatic figures is not original to Greece, the most complete and interesting example of this practice is among the remains of ancient art at Athens. "To the north of the Parthenon, at the distance of about one hundred and fifty feet, are the remains of three contiguous temples. That towards the east was called the Erechtheum; to the westward of this, but under the same roof, was the temple of Minerva, with the title *Polias*, as protectress of the city; adjoining to this, but under the same roof, is the Pandrosium, so named because it was dedicated to the nymph Pandrosus, one of the daughters of Cecrops." This is an open portico, composed of six Caryatides, four being placed in front and two in the sides; five of the statues remain to the present time. Within the Pandrosium was the olive tree, said to have been produced by Minerva in her contest with Neptune for the patronage of the city; it was called *pankypnos*, incurved, from its branches having bent downwards after it had grown up to the roof; and under the tree stood the altar of Jupiter Herceus. (Stuart's Athens.) These Caryatides agree perfectly with the description of Vitruvius: they are designed in a grand and broad style, their drapery is ample and flowing, their hair arranged with art. The height of the figures is seven feet nine inches, including the capital and plinth: their attitudes are simple and symmetrical; their air serene and tranquil. The statues are placed upon a continued pedestal, but with separateplinths to each. Above the head rises a capital, somewhat resembling that of the Doric order, and upon the capitals is placed an entablature, very nearly three feet high, but consisting only of architrave and cornice, the frieze being suppressed. The cornice is denticulated and the mouldings enriched; the upper fascia of the architrave is singularly ornamented with little rounds disposed at equal distances. It is not easy to account for the singularities of the entablature and its extraordinary height compared to the figures; probably a Caryatic portico was not considered as subject to any of the common rules of architecture. The reader will find an elevation of this monument in *Plate XIX. of Architecture*.

The Caryatides of the Villa Albani are another beautiful example; they are female statues clothed in long garments, the arms and necks ornamented with bracelets and necklaces, the head-dresses carefully arranged. A Greek inscription on one of them informs us, that they were the work of two Athenian sculptors, Crito and Nicolaus. Winckelmann is of opinion that these artists arrived at Rome about the time of Julius Cæsar; but whether these figures were executed at Rome, or transported there by some Roman plunderer, cannot be known. It seems probable, from a certain want of symmetry in their attitude and ornaments, that they are only part of a larger number and were not intended to be arranged contiguously. One of them has the head enveloped in a veil, which ascends to the top of the capital. The capital of another is plain and without ornament, the others are decorated with as much elegance as richness.

Among the antiquities of Rome there are various fragments of statues, which, from their attitudes and the capitals on their heads, may be supposed to have served as supports to the entablatures of buildings. It appears, that the inside of the Pantheon was ornamented in this manner

by Diogenes the Athenian; they were probably executed in basso-relievo, and employed in the Attic over the columns.

In the tomb of the freed-man of Sextus Pompeius, on the Appian way, there is an example of Caryatides of both sexes. They are in basso-relievo, and decorate rather than support the different stories of the columbarium. The first order consists of female figures draped, who, with extended arms, support a great veil which entirely surrounds them. They have no capitals; but their feet are mounted on smallplinths. The Caryatides in the upper story are of a particular kind, and of an invention sufficiently capricious. They are naked figures, whose heads, surmounted with capitals, support the cornice, and in their hands each holds a column perpendicularly, which supports nothing. This fancy seemstohave given rise to one still more whimsical, which has been executed by Daniel de Volterra, in his chapel of La Trinita del Monte, where there are figures supporting in one hand a capital, and in the other the column adapted to it.

These freaks of imagination, it is hardly necessary to observe, are only tolerable in the arabesque, where may be found an ample collection of figures, which the caprice of decoration has adapted to the office of Caryatides.

It would be generalizing too far to include, among the subjects of this article, the compositions of winged genii, terms, griffins, and so many other fantastic animals which adorn and support altars, tripods, vases, and other antique utensils. These objects, though confined by the realities of execution and the convenience of use to more connection and probability than the dreams of arabesque, are not amenable to the grave laws of architecture. It is on account of not having perceived the limits of imagination in these different walks of arts that the Caryatides, which were originally a licence in architecture, have become, under the chisel of the moderns, abuses intolerable and unworthy of indulgence from the least scrupulous reason.

This censure is not, however, applicable to the earliest revivers of this style of decoration; and we must do the justice to that distinguished artist Jean Goujon, to allow, that in the beautiful Caryatides which support the tribune of the former *salles des gardes* of the Louvre, he has conceived an idea just, grand, and superior to every other modern instance. This monument consists of four female figures, twelve feet in height, elegantly draped, with capitals on their heads, and standing on circular pedestals; which support an entablature of the Ionic order, richly ornamented, one quarter of the height of the statues and pedestal. What is remarkable, the artist has represented the arms of the figures as truncated a little below the shoulder. It is certain, that this instance bears considerable resemblance to the Caryatic portico at Athens, by the general idea of a gallery projecting from a larger mass of building, by the number of figures being in both cases four in front, their symmetrical arrangement, and particularly by the arms, which may be thought to be truncated in imitation of those which time has mutilated. We cannot say, however, whether or not Jean Goujon had any knowledge of the Athenian Caryatides; if not, the merit of the invention and composition does the greatest honour to his genius; and even if he were acquainted with them, such an imitation shews consummate taste and judgment, while the details remain intirely his own.

It is difficult to find a subject of approbation in any other modern instance of Caryatic figures. Those of the celebrated Loggia de Lanzi, by Orcagna at Florence, and a multitude of other Atlantes in that town and elsewhere, which are seen bending under the weight of an architecture which crushes

crushes them, are but capricious inventions, where the sculptors have rather considered their art than its harmony with the architecture.

Every one who is acquainted with the history of the fine arts after their revival in Italy, knows how much the style of sculpture and architecture was influenced by that of painting. Painting was the favourite art, that which produced most genius, and was often exercised in common with the other arts by the same person. But it would not be difficult to show, were this the proper place, that the principles of painting are very frequently in contradiction to those of sculpture, and still more of architecture. Hence, arose a most abundant crop of abuses, from which the immediate proximity of antique examples could not preserve the building art, when the painters of decorations became its arbiters, and fictitious architecture its model. Among these must be reckoned the Caryatic figures, which became the common ornaments of ceilings and vaults under the Carracci, Domenichino, Lanfranco, and many inferior artists and imitators. The composition of these had no other rule than the caprice of the painter, who regarded them as a kind of academy figure, susceptible of all the extravagancies of attitude and all the ostentation of anatomy.

We now come to the theoretical and critical portion of this article; and, in the first place, it merits consideration, whether the employment of Caryatides is not radically faulty as violating nature and the essential principles of imitation. It may be urged as an obvious impropriety to make the figures of men and women support the enormous load of the entablatures and coverings of buildings. The sight and imagination seem to be equally offended by the necessity of admitting the representation of circumstances of which the reality cannot for an instant be supposed possible.

If the example and authority of perhaps all nations who have been distinguished in architecture were considered sufficient, these objections would be answered by the preceding article; but as this custom might have no other than religious and political motives, it is not impossible that taste and rational criticism might be at variance with such institutions, and agree to banish from modern works a practice which, having no longer any connection with these motives, or any other object than the gratification of the sight, offends gratuitously the principles or the appearance of solidity. We do not doubt, however, that Caryatides may be defended on the following considerations.

Sculpture, though it realizes in its imitations the external forms of objects, departs so widely from them in colour and texture, that no art is less capable of producing illusion: the sight is more affected by colour than figure. Zeuxis might deceive the birds with his bunch of grapes, and his competitor him with the curtain; but certainly a statue was never taken for a man. Accordingly, every production of sculpture may be considered both with regard to the object imitated, and the matter of which that imitation is composed. With regard to the first, nothing undoubtedly is more absurd than to cause a man to perform the impossible function of a column; but with regard to the second, nothing is less unreasonable and more possible than to give that office to a statue, whose solidity is equal, and material the same. Why not support a stone entablature with a statue equally of stone. When therefore figures are employed as Caryatides, it must be understood, that these figures are not the living and animated expression, but the material and motionless image of the object represented. On this occasion a kind of counter-illusion is required of the spectator; and it is necessary that, overlooking every thing of deception, which might lead him to forget the material, he should stop at the first impression

of the senses, and instead of yielding flesh, see only inflexible marble and bronze. This is not a difficult effort but the natural impression, when the sculpture in harmony with the architecture does not pretend to too much motion, action, and life. Nobody, in seeing the Egyptian statues, can say, that nature and probability could be violated by such allegorical supports.

On the other hand, when the describer of Kailasa observes, that the basement, sculptured with elephants and lions, gives the whole mass the appearance of mobility on these mighty animals; he reports a severe censure, for this is exactly the air that a great edifice ought not to have.

From what has been advanced, it cannot be denied as a general proposition, that Caryatides are admissible in the most regular and consistent architecture. Reason demands real, and taste apparent, solidity in supports; now the first exists incontestibly in the material of which these figures are formed, and the second may be preserved with attention to the rules of propriety, indicated by the nature of the objects, and which we shall proceed to discuss.

Considering the preceding observations, good taste will include in a general censure, all the figures so commonly seen bending under the masses which overwhelm them, those symbols of slavery whose laborious attitudes affect the spectator with ideas of oppression and misery. The more the sculptor displays of anatomy, the more forcibly he expresses the contraction of the muscles; in short, the more he gives of truth, in the action and movement, the more he will incur of blame from sound criticism: His figures appear weaker as they make the more effort; and though good statues, they will be bad Caryatides.

Let the figures intended for this purpose, broad and grand in their proportions, approaching the colossal in dimensions, simple and upright in attitude, severe in expression, present to the spectator an immovable tranquillity in their appearance. Let symmetry prevail in their position and accessories. Let the apparent weakness of the neck be corrected by tresses of hair descending on their shoulders, and the drapery, agreeably defining the forms of the limbs, but tending to perpendicular folds, strengthen the figure below, and give solidity to the whole. Thus we have almost described the Caryatides of Athens, or of Jean Goujon. This artist, a sculptor and architect, had so well conceived the rules of taste proper to the species of sculpture in question, that to take away all pretence of illusion, he has represented the figures, as has been already mentioned, without arms, and under the appearance of mutilated effigies. However, without carrying our scruples so far on this point as Jean Goujon, it will be sufficient to imitate him in the general character of gravity and austerity which he has imprinted on this performance.

It seems necessary to give capitals to Caryatic figures to prevent the disagreeable sensation produced by the architrave resting immediately on the head, and to avoid the abrupt contact of the forms of sculpture and architecture by an intermediate object partaking of both. The capitals in antique examples sometimes approach the Doric form, as in the Athenian Caryatides, and sometimes the Corinthian bell-shape, as in those of the Villa Albani. The first is rich and well adapted to the shape of the head, the other has more lightness and elegance. It is proper in these things to keep a medium between the rigour of architecture and the caprices of mere ornament. Some antique capitals have been found imitating a basket, but these cannot be recommended.

Caryatides as statues require to be raised on pedestals. In the Athenian instance a continued stylobata answers this purpose.

purpose. Jean Goujon has used insulated pedestals, which are circular, apparently to give more the air of a column to the whole.

The Pandrosium at Athens, though only one example, is of the highest importance as being complete in itself, giving not only the best model of the figures proper for the purpose, with their appropriate pedestal and entablature, but also the relative proportion of such a portico to the adjoining building, and of Caryatides to columns. The entablature, as has been before observed, is very remarkable in several respects, and first, in height compared to the figures being 2 feet $11\frac{3}{4}$ inches to 7 feet 9 inches. We may perhaps find the motive of this extraordinary weight in considering that a human figure amply draped as these are, presents a larger mass than any column. However, it cannot be denied, that the proportion of the entablature is greatly exaggerated, and produces an unpleasing effect. In the next place, the frieze is suppressed, a singularity which we believe is not to be found in any other antique monument of the smallest credit, neither is the effect very good, as the mass is too much divided into equal parts. On the whole, though it would be absurd to conclude from a single example, that the ancients had adapted any one particular entablature to this kind of order, we may infer from such remarkable deviations that these objects are not to be considered within the limits of regular architecture, but are at the discretion of the designer within the limits of reason and taste.

The proportion of Caryatides to columns when seen together, is another point that will require attention in execution. That the first should be less is evident, but it is impossible to say what dimensions will in all cases have the best relation. The figures ought to appear colossal without enfeebling the effect of the columns. The proportion observed in the Athenian example, where this effect has been very happily attained, are, 7 feet 9 inches, the figures, 18 feet 5 inches, the columns which are the nearest in contact.

The proper application and allegory of Caryatides will come next under consideration. Chambray, an able and eloquent author, whose opinions always merit attention, observes in the "Parallèle de l'Architecture antique avec la moderne," that there are few occasions in which Caryatides can be employed with propriety, though the generality of modern architects have introduced them indifferently in all kinds of buildings. For not only in the palaces of princes, within and without, but in private houses, and in churches even, and sepulchres, every place is filled with them without any regard to history or decorum; and often, by an insupportable absurdity, they substitute for these miserable captives the venerable figures of virtues, muses, graces, and even angels, where they ought rather to enslave and confine the vices.

In reply to this, we must observe, that if the artist be confined strictly to the origin and motive attributed to this practice by Vitruvius, he can never employ Caryatic figures. The memorial of an outrageous severity inflicted on the fair and innocent, is unworthy to be perpetuated.

The Persian gallery of Sparta, though not consistent with the delicacy of modern feelings, was a noble trophy of valour and patriotism worthy of the occasion, and worthy of the people; but the people were Greeks, and the occasions Thermopylæ and Platea. Such deep injuries, and such glorious revenge, may well justify a triumph, that in moderate war would be barbarous and unmanly. Thus did the bone-heap of Murten record and inspire the patriotic valour of the Swiss. But the modern artist is called upon by every feel-

ing of propriety, to reject these emblems of vengeance; these miserable captives, whose figures only excite contempt towards the insulting conqueror.

Caryatic figures are in themselves more picturesque and interesting than any columns, but the proper employment of them is on this account more difficult. They have too much character to enter indifferently into ordinary works. Of a statue we demand an explanation, and the occupation of Caryatides seems to render it proper that they should be the representations of allegorical personifications rather than of human individuals. A just and consistent allegory is then the first requisite of Caryatides; for to represent them as mere statues, without any meaning, as Jean Goujon has done, seems both an impropriety and a poverty of invention; and with deference to M. Chambray, we can conceive situations where the figures of virtues, muses, and angels, would be both beautiful and proper. Pococke, Norden, Denon. Dict. Meth. Stuart, Daniell. Chambray.

CARYL, JOSEPH, in *Biography*, one of the ministers ejected by the act of uniformity, was born in London in 1602, educated in Exeter college, Oxford, and afterwards became preacher to the society of Lincoln's Inn. He was a member of the assembly of divines, and one of the tryers for approbation of ministers; and in all the stations he occupied maintained a respectable character for learning, piety, and modesty. By order of parliament he attended the king at Holmby house, and was one of the commissioners in the treaty of the Isle of Wight. After his ejection in 1662, he lived privately in London, and preached to his congregation whenever the times allowed. He was a moderate "Independent," and distinguished himself by his learned and voluminous "Exposition on the book of Job." He died in February, 1672-3, in the 71st year of his age. Neal's Hist. of the Puritans, vol. II. p. 689. 4to.

CARYLL, JOHN, an English poet of the Roman Catholic persuasion, was secretary to queen Mary, the wife of James II.; and having shared the fallen fortunes of his master, was rewarded for his attachment, first with knighthood, and afterwards with the honorary titles of earl Caryll and baron Dartford. In the reign of queen Anne he was in England, and recommended to Mr. Pope the subject of the "Rape of the Lock," who at its publication addressed it to him. He was the author of two plays, viz. "the English Princess, &c." 1667, 4to.; and "Sir Solomon, or the Cautious Coxcomb," 1671, 4to.; and in 1700, he published the "Psalms of David, translated from the Vulgate," 12mo. He was living, at a very advanced age, in 1717; but the time of his death is not ascertained.

CARYOCAR, in *Botany*, Linn. Mant. 247. Schreb. Juss. See PEKEA.

CARYOCATACTES, in *Ornithology*, the nut-cracker of English writers, is so denominated by Gesner, Willughby, and Ray, whence its Linnæan specific name. See CORYUS CARYOCATACTES.

CARYOCOSTYNUM, in *Pharmacy*, a kind of purgative electary, the two principal ingredients of which, that give the denomination to the whole, are cloves, and costus. It works briskly, and fetches the humours from the most remote parts; whence, and by reason of its warmth, it is prescribed against rheumatic, arthritic, hydropic, paralytic, &c. disorders.

CARYOLOBIS, in *Botany*, a genus formed by Gærtner for the seed of an unknown East Indian plant, remarkable

markable for its singular structure, having within it a central pillar which perforates the axis of the embryo. It is said by Bosc. to be nearly allied to Cocoloba.

CARYONES, in *Ancient Geography*, a people placed by Ptolemy in European Sarmatia, between the Alans and Amaxobians. M. Peyssonel classes them among those who bore the name of Vandals.

CARYOPHYLLASTER, in *Botany*. Rumph. amb. See *DODONÆA viscosa*.

CARYOPHYLLATA. Tournefort, class 6. § 7. gen. 6. La Marck, Flor. Franc. 742. and Encyc. sub Benoite. See *GEUM*.

CARYOPHYLLATA, Dod. Brunf. C. vulgaris, Bauh. Pin. C. urbana, Scop. See *GEUM urbanum*.

CARYOPHYLLATA, virginiana, Herm. par. See *GEUM virginianum*.

CARYOPHYLLATA aquatica, Bauh. Pin. C. septentrionalium, Lob. C. rivialis Scop. C. nutans, Crantz. See *GEUM rivale*.

CARYOPHYLLATA alpina lutea, et minor, Bauh. Pin. Barrel. C. montana, Scop. See *GEUM montanum*.

CARYOPHYLLATA alpina, apii foliis, Bauh. pin. C. alpina tenuifolia, Barrel. See *GEUM reptans*.

CARYOPHYLLATA alpina quinquefolia, Bauh. pin. See *ANEMONE narcissiflora*.

CARYOPHYLLEI, in *Botany*, the forty second natural order in the *Philosophia Botanica* of Linnæus, and the twenty-second in the *Prælectiones* published by Giseke; so called, not as including the caryophyllus of Linnæus, which actually belongs to a different natural order; but in reference to the caryophyllus of Tournefort taken up by him from the older botanists, which Linnæus called *Dianthus* without assigning a sufficient reason for changing the name, and as he still continued to call the natural order of which his *dianthus* may be considered as the prototype, by its ancient appellation, with a certainty of introducing a palpable confusion into the nomenclature. He has been followed in both cases by Jussieu, without a comment; and by Ventenat, with a remark pointing out the inconsistency. Linnæus gives it the following character. *Root* fibrous. *Stem* herbaceous, seldom shrubby, jointed: branches generally alternate. *Leaves* simple, almost always inclining to lanceolate, undivided, sessile, or narrowing into a petiole, opposite, obovate, most commonly smooth. *Flower* rarely sessile; stamens either equal or double the number of the petals; pistils from one to five. *Fruit* a capsule, one-celled, or with as many cells as there are styles.

The genera enumerated in *Philosophia Botanica* are dianthus, saponaria, drypis, cucubalus, silene, lychnis, coronaria, agrostemma, frankenia, alfine, cerastium, holostemum, arenaria, pharnaceum, spergula, sagina, moehringia, scleranthus. In the posthumous lectures they are divided into four sections; *α.* dianthus, saponaria, gypsophila, velezia, drypis, silene, cucubalus, lychnis, agrostemma, sheffieldia? *β.* spergula, cerastium, arenaria, stellaria, alfine, holostemum, cherleria, sagina, moehringia, buffonia, γ. pharnaceum, glinus, mollugo, polycarpon, minuartia, quera, ortega, læsingia, rotala. *δ.* scleranthus, polypremum. The first section comprehends the proper caryophyllate flowers of Tournefort, which have a tubular calyx, and unguiculated petals with a flat border.

Jussieu and Ventenat have given in most respects the same general character, and assigned nearly the same genera to their caryophylleæ. According to Ventenat the plants of this family are in general herbaceous and natives of Europe. Their *stems* are commonly cylindrical, and never more than

three or four feet high; branches axillary, opposite and apparently articulated at each knot. *Leaves* opposite and connate at their base, very rarely whorled, always simple and entire, generally destitute of stipules. *Flowers* almost always hermaphrodite, subject to become full or double by cultivation, commonly axillary, sometimes terminal. *Calyx* one-leaved or divided, almost always permanent. *Corolla* rarely none; petals generally unguiculate, equal in number and alternate with the segments of the calyx. *Stamens* in some genera less numerous than the petals; more frequently equal in number and alternate with them; or twice as many, half of them inserted into the receptacle, and the other half alternately into the petals. *Germ* simple; style rarely single; stigmas equal in number to the styles. *Fruit* capsular, almost always many-seeded, one or many-celled. *Seeds* inserted into a central placenta or receptacle, or each of them attached to the bottom of the capsule by a small umbilical cord. *Perisperm* farinaceous, central, i. e. surrounded by the spiral embryo. Radicle inferior.

The whole order is divided by Jussieu into seven sections. 1. Calyx divided; stamens three; style single or triple. ortegia, læsingia, holostemum, polycarpon, donatia, mollugo, minuartia, quera. 2. Calyx divided; stamens four; styles two or four. Buffonia, sagina. 3. Calyx divided; stamens five or eight; styles two, three or four. Alfine, pharnaceum, moehringia, elatine. 4. Calyx divided; stamens ten; styles three or five. Bergia, spergula, cerastium, cherleria, arenaria, stellaria. 5. Calyx tubular; stamens ten, generally inserted alternately into the receptacle, and petals; styles two, three, or five. Gypsophila, saponaria, dianthus, silene, cucubalus, lychnis, agrostemma. 6. Calyx tubular; stamens less than ten; styles two or three. Velezia, drypis, sarothra. 7. Genera allied to the caryophylleæ. Rotala, frankenia, linum, lechea. Ventenat has adopted the same divisions, but has omitted donatia, bergia, and rotala; added hagæa, and githago; and removed sarothra to the gentianæ.

CARYOPHYLLON *Plinii*, the fruit of the *cassia caryophyllata*, or cloveberry tree, whose bark is used in medicine

CARYOPHYLLUS, in *Botany*. (Gr. κρυφοφυλλον, nut-leaf. Paul. Æginetus). Clove-tree, Giroflie, Fr. Linn. gen. 669. Schreb. 843. Gært. 202. Juss. p. 324. Vent. vol. 3. p. 327. Class and Ord. *Polyandria monogynia*, Linn. *Icosandria*, Schreb. Lam. Nat. Ord. *Hesperideæ*, Linn. *Myrti*, Juss.

Gen. Ch. *Cal.* Perianth superior, small, permanent; segments four, concave, spreading. *Cor.* petals four, roundish, larger than the calyx and alternate, with its segments caducous. *Stam.* numerous; filaments capillary, a little longer than the petals (but not so expressed, either in Sonnerat's, Woodville's, or La Marck's figures), attached to the outside of a quadrangular, hollow elevation within the segments of the calyx; anthers small. *Pist.* germ inferior, oblong, two-celled; style simple, in the centre of the quadrangular elevation, but perfectly distinct from it; stigma simple. *Peric.* Berry oval-oblong, one or two-celled, crowned with the permanent calyx, and quadrangular elevation. *Seeds* one or two, large.

Ess. Ch. *Cor.* four petalled. *Cal.* four-cleft. *Berry* inferior, one or two-celled.

Sp. 1. C. aromaticus, Linn. Sp. Pl. Bauh. pin. p. 410. Tourn. app. p. 661. Pluk. Alm. tab. 155. fig. 1. Rumph. amb. tab. 1. 2. Sonnerat. guin. nov. tab. 119. Woodv. med. bot. tab. 135. Gært. tab. 33. Lam. Illust. tab. 417. (Eugenia caryophyllata, Willd. Caryophylli,

phili, Lob. ic. 2. p. 147. Tshinka, Pison. arom. p. 177.) "Leaves lanceolate, acuminate." A small tree. *Trunk* from fifteen to thirty feet high, a foot thick, dividing into branches four or five feet from the ground, and forming a dense, pyramidal head; branches opposite, slender, generally horizontal, but so weak as to stand in need of support when loaded with fruit. *Leaves* from two inches and a half to four inches long, near an inch and a half broad, with a strong midrib, and parallel lateral nerves, opposite, tapering at both ends, quite entire, smooth on both sides, reddish and rather shining above, bright green underneath, and besprinkled with minute resinous points, which placed under a magnifier in a strong light, are generally transparent; petioles from six to nine lines long, red, and according to Sonnerat, the most aromatic part of the plant. In Sonnerat's and Woodville's figures, they are much shorter than in La Marck's, and soon begin to expand into the proper leaf. *Flowers* odorous, from nine to fifteen or more on a branch, growing often by threes on partial peduncles in terminal cymes, or rather corymbose panicles; filaments white; anthers yellow; peduncles smooth; bractes two under each division of the panicle, and at the base of each flower very small, caducous. There is a variety figured by Rumphius with four larger bractes, which Linnæus seems to have mistaken for a second calyx, or as he calls it a perianth of the fruit placed under the germ, in contradistinction to the superior perianth of the flower. *Fruit* coriaceous, reddish brown, oval-oblong, not falling spontaneously from the tree till the ensuing year. The bark, fruit, roots, and leaves, are all more or less aromatic. A native of moist situations in the Molucca islands and New Guinea. 2. *C. obtusifolius*. Sonnerat nov. guin. pl. 120. "Leaves ovate-wedge-shaped, obtuse." All parts of the plant scentless. *Leaves* rounded at their summit, pale green, on long petioles; cloves bitter. Sonnerat's figure represents a branch with only two terminal flowers. A native of New Guinea.

Sonnerat mentions another scentless species or variety differing from the preceding, in having the segments of the calyx extremely long and acute. Loureiro found in Cochinchina what appears to be still a different species with scarcely any smell or taste, which he thus describes. A middle-sized tree with few branches. *Leaves* broad-lanceolate, quite entire, smooth, opposite, petioled. *Flowers* white; peduncles many-flowered, regular, upright, terminal; calyx tubular, oblong, four-cleft; segments acute, short, somewhat upright; petals roundish, concave, small. *Pericarp* a calycine berry, ovate-oblong, corticose, pale brown, crowned with the segments of the calyx. *Seed* single.

Obs. The clove spice does not appear to have been known by the ancient Greeks and Romans. Diodorus, indeed, has conjectured, and Bodæus a Stapel agrees with him in thinking, that the tender branches of this tree are the real cinnamon of the ancients; but as far as we are able to judge, the supposition is without probability. The first distinct mention of it is by Paulus Ægineta, a Greek physician of the seventh century, who observes that it does not correspond with its name which seems to imply a leaf in the shape of a nut, and of which Mr. Ray long after acknowledged that he could not guess the meaning; but is properly a kind of rod-like flower, the produce of an Indian tree. He says it is of a dark colour, about the thickness of a finger in length, aromatic, acrid, somewhat bitter, warm and dry in the third degree, much used, both in food and as a medicine. It was probably first brought into Greece from Arabia, as it corresponds sufficiently with the description of the Carumfel of Serapion, an Arabian physician nearly con-

temporary with Paulus Ægineta, and of the Charumfel bellum of Avicenna, another physician of the same country, who flourished at the beginning of the eleventh century. When the Portuguese began to navigate the Indian seas about the close of the fifteenth century, they soon became sensible of the value of the clove as an article of commerce, and are said to have sown many thousand seeds in the island of Amboyna, about four years before it was taken by the Dutch. To this island and the neighbouring smaller ones of Honimfa, Oma, and Noussa-lant, commonly called the Ulassiers, its new masters, with that narrow spirit of mercantile selfishness which is so generally attributed to them as a national characteristic, have long wished to confine its cultivation, that they might monopolize the sale of it to themselves and have it in their power to fix upon it their own price. For this purpose, about the middle of the last century they compelled the kings of Ternate, Tidore, Machian and Bachian, and afterwards made a similar contract with the king of Bouton, to accept an annual payment, as a recompence for suffering the clove-tree to be extirpated throughout their dominions, and for assisting the Dutch agents in their periodical circuit of devastation. The king of Ternate is said by Du Tour in Nouv. Dict. to have received annually about eighteen thousand rix-dollars, near four thousand pounds sterling; but according to Stavorinus, the king of Bouton received lately only 150 rix-dollars, or 32l. 14s. 6d. which is represented as a considerable sum in his treasury. The Dutch East India company are also bound to take at a fixed price all the cloves raised by the inhabitants of Amboyna. Besides these restrictions, they have sometimes thought fit to reduce the number in the islands appropriated to their growth. In 1769 it was ordered by them that more than five hundred thousand should not be suffered to remain in the island of Amboyna; in 1773, fifty thousand more were destroyed. But notwithstanding all the efforts of their illiberal policy, the clove tree is now known to grow so abundantly in New Guinea, and many other islands over which they have never obtained any influence, that even if there were a probability of their rising from their present degraded state, and recovering their former rank in the scale of nations, it would not be possible for them to renew so odious a monopoly. So long ago as 1770 the patriotic M. Poivre, then intendant of the isle of Bourbon, sent two ships to the spice islands under the direction of M. Prevost, a confidential friend well acquainted with the navigation of their coasts, for the express purpose of obtaining living plants and seeds to be cultivated in the French colonies. After several unsuccessful attempts, this able negotiator obtained from the kings of Gebi and Palam in the island of Ceram, sovereigns entirely independent of the Dutch East India company, a great number of plants both of the clove and nutmeg tree, as well as of ripe berries and nuts. In the year 1771 M. Prevost made another voyage to Gebi and returned in 1772 with a still more abundant cargo of trees and seeds. They were planted by M. Poivre in a magnificent garden prepared for them in the isle of France, whence they were afterwards exported in considerable quantities to Cayenne and Martinico. In Cayenne 4400 clove trees were gradually raised between the years 1779 and 1784, exclusive of those which had been distributed among private individuals. In 1785 the oldest of them, then of six years growth, produced a few small flowers; and two pounds and a half of cloves were collected from them. In 1786 the crop amounted to 95 pounds; and in 1787 to 273 pounds, when Lavoisier and the Count de la Luzerne were appointed to examine them and report their quality to the French government. The cloves of Cayenne proved equal to those of the East Indies,

and were even found to afford a larger proportion of essential oil. In 1792 the plantation contained 4500 fruit-bearing trees; and a merchant of Bourdeaux had sold in the preceding year 700 pounds of Cayenne cloves at a lower price than was asked for those from the Moluccas. The success of the plants sent to Martinico was not known to Du Tour, from whom these details are taken, that island having soon afterwards surrendered to the British arms; but we learn from the translator of Stavorinus's voyages to the East Indies, that in 1797, 305 pounds of cloves were imported into the port of London from Martinico, and in 1798, 200 pounds from the same island and 2981 from St. Kitts.

This spice, so much sought for in commerce, and so much esteemed by epicures, is not the ripe fruit of the plant, but the bud of the flower, which is found by experience to lose much of its aromatic quality if suffered to remain on the tree till the anthers have discharged their pollen, and the germ has become impregnated. In Amboyna it makes its first appearance at the beginning of the rainy season, and is of a dark green colour. In August and September it acquires its proper shape, and then gradually passes from green to yellow, and from yellow to red; but still has its stamens completely shut up in the unopened petals, which form a kind of globular button at the top of the calyx and germ. In that state it has a strong resemblance to a small nail; of which the closed petals and expanded segments of the calyx compose the head, and the germ, gradually tapering to a bluntish point, the lower extremities. The resemblance is so striking, that it has given rise to the vulgar name by which this article of commerce is known in most nations of Europe. The Dutch call it *naghel*, the Spaniards *clavo*, the Italians *chiodo*, and the French *clou*, from which the English word clove is evidently derived. When the cloves have thus arrived at what may be properly called their mercantile state of maturity, those within reach are gathered by the hand, and the rest, as most authors assert, are beaten down by poles or reeds; but, according to Stavorinus, are cut off with long hooks. The latter is the more probable account; for, as Mr. Ray observes, it is not easy to conceive how unripe fruit which in a healthy state is usually strongly attached to the tree, can be forcibly beaten off, without breaking or materially bruising the tender branches, which at the same time is expressly said to be carefully avoided, as a certain detriment to the crop of the ensuing year. The season of gathering continues from October to February. The cloves, as soon as they are gathered, are dried either in smoke over a fire, in the sun, or in a kiln. Stavorinus asserts that those which are dried in smoke are not good, and may be distinguished by their blacker colour, and their bending between the fingers: whereas those dried in the sun are of a reddish cast, and are not flexible, but brittle, snapping asunder upon being flippiped by the finger. Du Tour observes, that the oily part of the clove is best preserved when it is dried in a kiln. Those are always preferred in the market which appear plump, and leave an oiliness on the fingers when pressed, which have most of the aromatic taste and smell, and which retain the globular unexpanded corolla, a certain proof that they have not continued too long on the tree.

They are used in their native climate, and in almost every part of the civilized world, as an article of luxury, communicating a pleasing flavour to preserved fruit, sauces, ragouts, and liqueurs. They are likewise employed by the perfumer. In medicine they are esteemed tonic, cordial, and exhilarating, acting as a powerful stimulant to the muscular fibres, and superior to most of their class in cases of atonic gout, paralysis, &c. They have a strong agreeable smell, and a bitterish, hot, but not very pungent taste, qualities which

are completely extracted by rectified spirit. To water they communicate more of their smell, but less of their taste; and in distillation with water, they yield one-sixth of their weight of essential oil, smelling strongly of cloves, but less pungent than the spirituous extract. This oil is an article of the Pharmacopœias, and enters into several officinal compositions. It often gives instant ease in the tooth-ach; and is used with benefit as an external application in paralytic and lethargic affections. That which is commonly met with in the shops, and received from the Dutch, is much more acrimonious than the genuine distilled oil, and is probably sophisticated by an admixture with the resinous part of the cloves, from which it receives its peculiar acrimony and high colour.

Valentyn describes four sorts of cloves; that which he calls the male is the sort used for drying; the female is of a pale colour, and the best for extracting oil; the king's clove is a very scarce species, bearing larger and double fruit, and is perhaps that figured by Rumphius, which he calls *regium*; the fourth sort, or rice-cloves, are very small, and likewise very rare. Whether the trees which produce these different kinds are distinct species, or only varieties, we cannot determine.

The berries which ripen on the tree are emphatically called mother-cloves, as being chiefly destined to give birth to a future progeny. The Dutch, however, preserve them in sugar, and value them as an useful assistant to digestion, and a pleasant antiscorbutic sea-store. See Bodæus a Stapel's Notes to Theophrastus, Raii Historia Plantarum, Stavorinus's Voyages to the East Indies, Sonnerat's Voyage to New Guinea, Woodville's Medical Botany, La Marck in Encyclopédie, and Du Tour in Nouveau Dictionnaire, under *Epice* and *Geroflier*.

On re-considering the subject, since the article *Caryophyllei* was drawn up and sent to the press, we are convinced that Linnæus was right in retaining for the Asiatic spice the name of *Caryophyllus*, which had been originally formed for it by the Greek merchants of the middle ages, who seem to have mistaken the dried cloves for the leaves of the plant; and that he had no alternative but to invent a new one for the European plants, which could not possibly be arranged under the same genus, although they had received the same appellation from the earlier modern botanists, on account, as Mr. Ray has observed, of some resemblance to the smell of the original *caryophyllus*, or clove, in one of the species at least which is still called by gardeners the clove pink (*Dianthus caryophyllus*, Linn.). He is to be censured only for distinguishing, by the name of *Caryophyllei*, a natural order which does not contain the true *Caryophyllus*, and which he might have been led by an obvious analogy to call *Dianthei*. It is surprising that he should have been followed by Jussieu in so gross an impropriety.

CARYOPHYLLUS arvensis glaber, Bauh. Prod. 105. See *AIRA caryophyllea*.

CARYOPHYLLUS arvensis umbellatus, Bauh. Pin. 210. See *HOLOSTEUM umbellatum*.

CARYOPHYLLUS spurius inodorus, Sloan. Jam. Cates C. Car. 2. See *CORDIA sebestena*.

CARYOPHYLLUS montanus major & minor, Bauh. Pin. 211. See *STATICE armeria*.

CARYOPHYLLUS caruleus monspeliensium, Bauh. Pin. 209. See *APHYLLANTHES monspeliensis*.

CARYOPHYLLUS languescens vi aromaticus, Pluk. Alm. tab. 274. fig. 2. See *EUGENIA caryophyllifolia*.

CARYOPHYLLUS saxatilis foliis graminis umbellatis corymbis. — *Saxatilis fol. gram. minor*. — *Minimus muralis*, Bauh. pin. 111. See *CYSOPHILA fastigiata, repens, & muralis*.

CARYOPHYLLUS hortensis barbatus latifolius & angustifolius.
I — *Sylvestris*

—*Sylvestris vulgaris latifolius*.—*Barbatus sylvestris*.—*Sylvestris prolifer*.—*Hortensis simplex, flore majore, altilis major, & maximus ruber*.—*Sylvestris biflorus*.—*Simplex supinus latifolius*.—*Sylvestris flore laciniato sine corniculis odoro*.—*Sylv. alter, flore laciniato odoratissimo*.—*Syl. repens multiflorus*.—*Pumilis latifolius, & syl. flore magno inodoro hirsuto*.—*Arborefcens creticus*. Bauh. Pin. p. 208, 209, 210. See DIANTHUS *barbatus, carthusianorum, armeria, prolifer, caryophyllus, sylvestris, deltoides, plumarius, superbus, virginicus, alpinus, & arborefcens*.

CARYOPHYLLUS *saxatilis strigosior*, Bauh. Pin. See DIANTHUS *filiformis*.

CARYOPHYLLUS *græcus arboreus*.—*Creticus arboreus*, Tournef. Cor. 23. See DIANTHUS *arboreus & juniperinus*.

CARYOPHYLLUS *alpinus calyce oblongo hirsuto*, Bauh. Pin. 209. See CUCUBALUS *pumilis*.

CARYOPHYLLUS *holosteus alpinus gramineus*.—*Saxifragus*, Bauh. Pin. p. 210, 211. See *SILENE rupestris & saxifraga*.

CARYOPHYLLUS *holosteus arvensis flore majore*.—*Arvensis glaber flore minore*, Bauh. Pin. p. 210. See STELLARIA *holostea & graminea*.

CARYOPHYLLUS *saxatilis, erice foliis, umbellatis corymbis*, Bauh. Pin. p. 211. See ARENARIA *tetragactra*.

CARYOPHYLLUS *pratensis flore laciniato simplici*, Bauh. Pin. 210. See LYCHNIS *flos cuculi*.

CARYOPHYLLUS *holosteus alpinus latifolius*.—*Holosteus tomentosus latifolius & angustifolius*, Bauh. Pin. 210. See CERASTIUM *latifolium & tomentosum*.

CARYOPHYLLUS, BROWN Jamaica. & Pluk. Alm. tab. 155. fig. 3, 4. See MYRTUS.

CARYOPHYLLUS *indicus*, Cam. Epit. 406. See TAGETES *erebia*.

CARYOPHYLLUS, *fungites sive caryophyllus marinus, planicus*, in *Natural History*, one of the synonyms of MADREPORA *ramea*.

CARYOTA, in *Botany*, (Καρύωτις, Diosc. Καρύωτος; Φωνίξ, Ætius, a palm, bearing nuts.) Linn. gen. 1228. Schreb. 1701. Juss. 38. Vent. 2. 129. Gært. 25. Nat. Ord. *Palme (Monæcia polyandria)*.

Gen. Ch. Male *Cal.* spathe universal; spadix branched; proper perianth three-leaved, Linn. (six-leaved, Gært.; six-cleft; the three outer segments short, not deeply divided, Vent.; short, membranous, entire, forming a little cup, Lam.) *Cor.* three-cleft, Linn. (of three oblong, concave, petals, Lam.; none, Gært. Vent.) *Stam.* numerous; anthers linear. Female. Perianth and corolla as in the male. *Pist.* germ superior, roundish; style acuminate, short; stigma simple, (twin, Gært.) *Fruit* berry roundish, one celled. *Seeds* one or two, large, flat on one side, convex on the other.

Eff. Ch. Male. *Calyx* common. *Cor.* three-cleft. *Stam.* numerous. Female. *Pist.* one; berry two-seeded, Linn.

Sp. 1. *C. urens*, Linn. Sp. Pl. Gært. tab. 7. fig. 3. Lam. Illust. Pl. 897. (Schunda-panna, Rheed. Mal. 1. tab. 11. Seguaster major, Rumph. Amb. 1. tab. 14.) "Fronds bipinnate; leaflets sessile; berry two-seeded." *Trunk* frequently so large as to be scarcely embraced by two men; rising to a considerable height, but not so high as the cocoa-palm; bark greyish; wood hard, solid, heavy; pith white. *Leaves* or fronds large, forming an ample head, twice winged; pinnules small with respect to the size of the leaf, wedge-shaped, obliquely truncated, and gnawed on the upper edge, finely striated lengthwise, brownish-green, shining. *Spathe* many-leaved, axillary within the lowest leaf. *Flowers* in pairs, on long, pendulous spikes, first green, then red or purple, finally yellow; filaments nearly as long as the petals. Berry about the size of a plum, globular, succulent, almost

black when ripe; rind thin; pulp soft and red, very sharp and acid. *Seeds* generally two, sometimes only one, wrinkled, hard. The farina of its pith resembles that of sago, but is less pleasant. A native of the East Indies. 2. *C. mitis*, Mart. Mil. Louréiro Coch. 569. "Fronds bipinnate; petioles of the pinnules nodding; berry one-seeded." *Trunk* fifteen feet high, two inches thick, very straight and regular. *Leaves* four feet long; pinnules wedge-shaped, many-nerved, obliquely bitten, on long slender petioles. *Spathe* simple, oblong, rather acute. *Spadix* branched; spikes simple, long. *Flowers* regularly disposed, with single females between pairs of males; filaments none; perianth of the females five-leaved; stigma bifid. *Fruit* about the size of a musket shot, round, coriaceous, smooth, black; pulp mild. *Seed* pale, softish. A native of Cochin China.

CARYSFORT, in *Geography*, a very small village, if indeed it can be called more than a house, in the county of Wicklow, Ireland, 7 miles S.W. from Wicklow, and 31 from Dublin. Before the union it sent two members to parliament, but it does not appear to have been ever a place of importance. Near it is Croaghan mountain, where gold was procured. See CROAGHAN.

CARYSIS, in *Ancient Geography*, an island of Asia Minor, on the coast of Lycia, which belonged to the inhabitants of Caria, according to Steph. Byz. It was one of the three small islands, Cræon, situate at the bottom of the north-west part of the gulf of Glaucus.

CARYSTIUM *linum*. See LINUM *carysium*.

CARYSTIUM *marmor*. See MARMOR.

CARYSTUS, in *Ancient Geography*, a town of Greece, in the island of Eubœa, situated in the southern part of the island, at the bottom of a small gulf which opened to the south-west. It was famous for the quarries of marble which were found in mount Ocha, at the foot of which it was situated. This marble was in high estimation among the Romans. Strabo says that this high mountain furnished the well known asbestos or amianthus. Ptolemy calls this town Caryste, and it is said to have derived its name from Carystus, the son of Chiron; whence it was also called Chironia; and it was likewise denominated Ægea, from Ægon, who is said to have reigned here, and is supposed by Stephanus to have given his name to the Ægean sea. The inhabitants of Carystus worshipped the god Briareus, who, according to Homer, was the same with Ægeon, adored by the Chalcidians; the name of Ægeon being given to him, as he tells us, by men, and that of Briareus by the immortal gods. Carystus has been since called Caristo, and Castel Rosso.

CARYUS, in the *Materia Medica*, a name given by Dioscorides, and some other of the ancient Greeks, to the *eryngium*, or sea-holly, called by us *eryngo*. It was thus named from its having a small head or cluster of flowers like a walnut. See ERYNGIUM.

CAS, ST. Bay, in *Geography*, a bay of the English channel, on the N.W. coast of France, where in 1758 the English made an unsuccessful landing, with the loss of about 1000 men. It derives its name from that of a village near it. It is 10 miles W. of St. Maloes, and 5 S.E. of cape Frehel.

CASA, JOHN DE LA, in *Biography*, a celebrated Italian writer, was the descendant of a noble family at Florence, and born in 1503. Having been educated at Bologna, and afterwards having pursued his studies for some time at Florence, under Ubaldino Bandinelli, he settled at Rome, and, in 1538, became clerk of the apostolical chamber. With the elegant and classical studies to which he was devoted, he combined, as was too frequently the case, the licentious manners of the capital; and as the fruit of his amours, he

had a natural son, whom he named Quirino. In 1540 he became a member of the newly instituted Florentine academy; and in 1544 he was made archbishop of Benevento, and also dispatched as nuncio to Venice. Failing to engage the Venetians to join in a league with pope Paul III. and Henry II. king of France, for controuling the dreaded power of Charles V., which was one object of his mission; he succeeded in another, for the purpose of carrying on a process against Vergerio, formerly the pope's nuncio in Germany, who had become a Lutheran. But although he drove him from Italy, Vergerio amply avenged himself by the injury which he did to Casa's reputation in Europe. Under the pontificate of Julius III. he was involved in the disgrace of cardinal Alexander Farnese, and obliged to quit Rome, and to retire to Venice, in the vicinity of which he passed several years in the private prosecution of his studies. Upon the election of Paul IV. he was recalled to Rome, and appointed secretary of state; but he never advanced to the rank of cardinal, which some have ascribed to the licentious writings of his youth. He died of the gout in 1556, at the age of 53 years.

John de la Casa has been always regarded as one of the politest writers of the most flourishing age of Italian literature, and one of the principal models of the pure Tuscan dialect. His verses, though defective in style, excel in elevation of sentiment and liveliness of imagery. Deviating from the course pursued by Petrarch and his imitators, he aimed at substituting a sublime and noble gravity to their perpetual softness and tenderness. He also adopted in his youth the burlesque manner of Berni, and other writers; and in this style of composition he wrote his famous "*Capitolo del Forno*," which, by its extreme indecency, fixed an indelible reproach on his name and character. This piece, and some more of his performances, have been suppressed in all late editions of his works; but they are printed among other compositions of a similar kind by Berni, Mauro, and others, at Venice in 1538. His Italian letters are elegant, but defective in point of ease and familiarity. His most celebrated work in Italian prose is the "*Galateo*," or Art of living in the World, which is a kind of system of politeness, that has been much esteemed, and translated into most of the languages of Europe. His orations have been much admired, as finished pieces of artificial eloquence. As a writer of Latin in prose and verse, Casa is one of the happiest imitators of the ancients, and his lives of the cardinals, Contarini, and Bembo, are master-pieces of their kind. His knowledge of Greek was displayed by elegant translations of the orations in Thucydides, and of that writer's description of the pestilence at Athens. Of the numerous editions of his works, that of Venice in 5 vols. 4to. 1728, is reckoned the most valuable, on account of its illustrations and biographical anecdotes. Gen. Dict. Gen. Biog.

CASA, in *Ancient and Middle Age Writers*, is used to denote a cottage or house.

CASA SANTA, denotes the chapel of the Holy Virgin at Loreto. This is properly the house, or rather chamber, in which the Blessed Virgin is said to have been born, where she was betrothed to her spouse Joseph, where the angel saluted her, the Holy Ghost overshadowed her, and, by consequence, where the Son of God was conceived, or incarnated. It is pretended to have been carried in May, 1291, through the air from Galilee to Tersato, in Dalmatia, by angels; and $4\frac{1}{2}$ years afterwards to have been removed to Italy, where about midnight, in December 1294, it was set down in a wood, in the district of Recanati, about a thousand paces from the sea. But it was nearly 200 years in Italy before any author of that country took any notice

of it. Of this building the Catholics tell many other wonderful stories, too childish to transcribe.

The Santa Casa, or holy chamber, consists of one room, the length of which is $31\frac{3}{4}$ feet, the breadth 13 feet and nearly 3 inches, and the height $18\frac{3}{4}$ feet. Formerly it had only a timber ceiling; but, lest by a great number of lights continually burning it should happen to take fire, Clement VII. caused a vaulted roof to be made. It was also strongly compacted with rafters, boards, and ropes, and supported by machines till the new foundation was carried up, so as to be joined with the old walls of the house. On the ceiling is painted the assumption of the Virgin Mary. On the west side of the window, through which the angel came into the house, and facing it, in a niche, stands the image called the great *Madona*, or lady, five feet high, made of cedar, and, as they say, wrought by St. Luke, who was a carver as well as a physician. The mantle or robe she has on, is covered with innumerable jewels of inestimable value. She has a triple crown of gold, enriched with pearls and diamonds, given her by Lewis XIII. of France, and a little crown for the child Jesus. The niche in which the image stands is adorned with 71 large Bohemian topazes; and on the right side of the image is an angel of cast gold, profusely enriched with diamonds and other gems, which is said to have cost 50,000 ducats, and which was offered by Maria Beatrix Eleonora, of the house of Este, queen of king James II. of England, that, by the intercession of the Virgin Mary, she might conceive a son. Accordingly, soon after, as it is said, she had a son; who has since occasioned so much noise in Europe, under the name of the pretender to the British crown. On the left side of the Virgin's image is a silver angel; and on the right hand another costly one, which was the gift of Lewis XIII. king of France for the birth of the dauphin, afterwards Lewis XIV. The robe which this famous image wore, when it was brought from Dalmatia into Italy, is of red camlet, and kept in a glass shrine. The dish out of which she and her divine infant are said to have eaten is a shallow bowl, of glazed earthen ware, plated over with silver. This utensil is not only kissed, but rosaries, medals, agnus dei's, crucifixes, and paper caps, painted with the image of the Madonna of Loreto, are rubbed against it, from a firm persuasion that they thus become an infallible remedy against the head-ache, and other diseases. Seven golden lamps are continually burning before the image; and other parts of the Casa Santa are illuminated by 37 silver lamps, which are supplied with oil out of legacies bequeathed, and ample funds established for this purpose. Notwithstanding the mean appearance of the walls within the Casa Santa, the outside is elegantly adorned with the finest Carrara marble, which case of marble was begun in 1514, in the pontificate of Leo X. and consecrated in 1538 by Paul III. The expense of this casing was enormous, and the most celebrated sculptors of the age were employed in adorning it. The edifice which encloses the holy house was designed by Bramante, and the sculpture was designed and executed by the most famous artists. It was completed in 1579, and Gregory XIII. had the honour of finishing this superb work. On the top of the Casa Santa is a little tower, in which are hung two small bells, that are rung in violent tempests of thunder and lightning, under a notion that their sound will disperse the storm, and prevent any injurious effects. There is one part of the Casa Santa which may be regarded as the holy of holies: for it is separated from the other part by a silver balustrade, and a gate of the same metal. It is said to be the spot where the Virgin was sitting when the angel Gabriel appeared to her at the time of the annunciation. The large church in which the case of the Casa Santa stands, as

if it were under a tent, is built of Istrian stone, resembling the Travertino stone used at Rome. The front is wholly of marble, and embellished with very fine sculpture, and over the portal is a statue of the holy Virgin. The three doors on this side of the church are bronze, with beautiful basso-relievos, representing different histories of the Old Testament. Over the middle door are these words "Domus Deiparæ, in quâ verbum Caro factum est." Keyßler's Travels, vol. iii. See LORETTO.

CASA Calanda, in *Geography*, a town of Italy, in the kingdom of Naples, and country of Molise; 21 miles E.N.E. of Molise.

CASA de la Contratacion, or the house of trade, in *Commerce*, a tribunal of Spain established at Seville, to the port of which the commerce of the New World was confined, as early as the year 1501, for the regulation of such commercial affairs as required the immediate and personal inspection of those appointed to superintend them. It may be considered both as a board of trade, and as a court of judicature. In the former capacity it takes cognizance of whatever relates to the intercourse of Spain with America; regulates the commodities that should be exported thither, and has the inspection of those that are received in return. It decides concerning the departure of the fleets for the West Indies; the freight or burden of the ships, their equipment, and their destination. In the latter capacity it judges with respect to every question, civil, commercial, and criminal, arising in consequence of the transactions of Spain with America: and in both these departments, its decisions are exempted from the review of any court but that of the *Council of the Indies*, which see.

CASA Grand, in *Geography*, a town of North America, in the country of New Mexico, and province of New Navarre, seated on a river N. of Buenaventura. N. lat. $29^{\circ} 30'$. W. long. $107^{\circ} 20'$.

CASA Massima, a town of Naples, in the country of Bari; 11 miles S.W. of Conversano.

CASA Vilieri, a town of Naples, in the country of Lavara; 7 miles S.E. of Sora.

CASAC, or **CAZAC**, a country of Asia, in the dominions of Persia, on the frontiers of Armenia, governed by princes of its own, nominally subject to Persia; about five leagues from north to south, and somewhat more from east to west. The inhabitants are defended from the Cossacks, and are represented as a rude and barbarous people. Casac, or Cazac Loré, is the name of the capital.

CASÆ, in *Ancient Geography*, a town of Asia, situate on the mountains of Pamphylia. Ptolemy.

CASÆ Bastalenses, or **Calanenses**, an episcopal see of Africa, in Numidia.—**C. Calbinti**, a place of Africa, in Mauritania Cæsariensis, between the colonies of Tipasa and Icosium, according to the Itinerary of Antonine.—**C. Favenses**, an episcopal city of Africa; but the province in which it was situated is not ascertained.—**C. Medianenses**, an episcopal city of Africa, in Numidia.—**C. Nigræ**, an episcopal city of Numidia.—**C. Sylvane**, an episcopal city of Africa, in Byzacium.—**C. Villa Aniceorum**, a place of Africa, according to the Itinerary of Antonine, in the route from Carthage to Leptis, between Tacapæ and the colony of Sarbaras.

CASAL, in *Geography*, a town of Italy, and capital of Montferrat, seated on the Po, formerly well fortified, and defended by a citadel, which was much admired. It was taken from the Spaniards in 1640; sold by the duke of Mantua to the king of France in 1681; taken in 1695 by the allies, who destroyed its fortifications; but retaken by the French and re-fortified. The king of Sardinia became master of it in 1706; but it was taken by the French

in 1745, retaken in 1746, and captured again by the French in 1796. The bishop is suffragan to the archbishop of Milan. N. lat. $45^{\circ} 7'$. E. long. $8^{\circ} 37'$.

CASAL-Maggiore, a town of Italy, in the duchy of Milan, and country of the Cremonese, seated near the Po, and made a town in 1754. N. lat. $45^{\circ} 6'$. E. long. $11^{\circ} 5'$.

CASALMACH. See IRIS.

CASAL-NOVO, a considerable town of Naples, in the province of Terra di Otranto, containing about 4000 inhabitants, noted for nothing but their taste for dog's flesh. At this place, as well as at Leccé, the tanners kidnap dogs, and tan their hides into an imitation of Turkey leather, with which they supply the gentlemen of the neighbouring cities, who are nice in their slippers. This demand for false Morocco occasions the slaughter of many dogs, and, without doubt, the custom of eating their flesh commenced among the needy tanners. Hunger and experience have taught their countrymen to consider the discovery as a very beneficial one. N. lat. $40^{\circ} 42'$. E. long. $17^{\circ} 36'$.—**Alfo**, a town of Naples, in the province of Principato Citra, N.E. of Policastro. N. lat. $40^{\circ} 16'$. E. long. $15^{\circ} 34'$.

CASALUS Sinus, in *Ancient Geography*, a gulf on the western coast of the island of Corsica.

CASAMA, a town of Asia, placed by Ptolemy in the Palmyrene territory, which was a country of Syria. The Notitia Imperii places it in Phœnicia. It was situated on a small river to the east of Carræ.

CASAMAN, a town of Asia, probably towards Armenia.

CASAMARRI, a people placed by Pliny in Ethiopia, near Egypt.

CASAN, or **KAZAN**, in *Geography*, a government of Russia in Europe, seated on the river Volga; bounded on the north by that of Viatka, on the east by the governments of Permian and Ufa, on the south by that of Simbirsk, and on the west by that of Neshnei Novogorod. It contains 13 districts, of which one is Casan, or Kazan, situate on the rivulet Casanka, which falls into the Volga. Its capital bears the same name. The kingdom of Kazan was conquered from the Tartars by Joan Vassilievitch II. or Basilowitz, after a contest of seven years; the capital of it surrendering to the victor in 1552; and at this time the empire of it was united to Russia for ever. In the Turkish and Tartarian language, Kazan signifies a large cauldron, of sufficient size to contain victuals for many persons; and this name is given by the Crim or Budziah Murfes to the families of their subjects, or vassals, reckoning about 10 men to a kazan. The present Kazan Tartars are but a feeble remnant of what they once were, partly consisting of those who remained in their old habitations, and partly of those who settled as fugitives in other districts of Russia.

CASAN, or **KAZAN**, a city of Russia, and the capital of the above government, situated near the Volga. This city was built in the year 1257, by a son of Baaty, a kinsman of the great Tchinghis; and its khanate asserted its independency about the year 1441, when the Krim disjoined itself from Kaptschah, or Capschac. Kazan consists of a strong fort, built with stone, the wooden town as it is called, and several adjoining suburbs, one of which is inhabited by Tartars. Here are several churches, most of which are constructed with stone, and also 11 convents in or near the town. The government chancery which is held in the fort, is under the direction of the governor and deputy governor. All the garrisons and regiments within the government of Kazan are under the command of the governor. The garrison of the city consists of three regiments, for the service of which a good hospital is provided. Kazan is an arch-

archbishop's see. At one end of the town is a manufactory of cloth, which is purchased by government for the cloathing of the troops. In a convent, called Siliandowo, seated on the river Cafanka, about two wersts from the town, is a school, where the children of Tartars are taught the Russian and Latin languages, the principles of the Christian religion, and the elements of philosophy, in order to qualify them as preachers for the conversion of the nations to which they belong. In 1749, and again in 1752, this city was totally destroyed by fire. The adjoining country is fertile in all sorts of fruits, corn, and pulse. The commerce of this government consists of furs, and of oak timber for the building of ships. For the preservation of the large oak-trees that grow in this district czar Peter I. appointed foresters, who had under them discharged soldiers; but these people committed every kind of excess among the inhabitants, and, therefore, they were abolished in the year 1762. However, every land-owner is careful of his oaks, as they fetch at all times a good price. In Petersburg every pood of oak timber, including the expence of transport, sells for 15 to 25 kopeeks. Casan or Kazan is distant 400 miles E. of Moscow, and 660 S.E. of Petersburg. N. lat. $55^{\circ} 43' 58''$. E. long. $49^{\circ} 8' 15''$.

CASANDRA, in *Ancient Geography*, an island placed by Pliny in the Persian gulf over against Persia Propria.

CASA-NOVA, MARC-ANTONIO, in *Biography*, called in his time, the prince of Latin epigrammatists, was born at Rome, where he flourished in the beginning of the 16th century. Attaching himself to the imitation of Catullus and Martial, he affected the wit and severity of the latter, but deviated from the nature and purity of the former. Whilst he was engaged in the service of the Colonna family, he exercised his satire against Clement VII. with so little moderation, that he was imprisoned and condemned to death, but pardoned by the pontiff. After the sack of Rome he was reduced to such extreme indigence, that he wandered about the streets begging bread, and died either of want or of the plague in 1527. Besides his epigrams, he wrote short eulogies or inscriptions on the principal characters of ancient Rome. A selection of his pieces may be found in the first volume of the "Delicæ Poetar. Italo-".

CASAPE, in *Ancient Geography*, a town of Asia, placed by Ptolemy in the interior of Hircania.

CASQUE, an ancient military habit considerably larger than an ordinary coat. It was formerly the common vestment or garment of all the French. And as this casaque was of a different colour in each company of their troops, it was easily and immediately discovered by this distinguishing difference, to what company any soldier belonged, who had been guilty of any disorder, outrage, or irregularity. When the casaque was abolished, it was succeeded by the echarpe or scarf, which was also of different colours in different companies.

CASAS, DE LAS, BARTHOLOMEW, in *Biography*, a prelate eminently distinguished by his humanity, was born at Seville in 1474, and in his 19th year accompanied his father, who sailed to the West Indies with Columbus. On his return to Spain after an absence of five years, he pursued his studies, and entered into the ecclesiastical order. When Columbus made a second voyage to Hispaniola, Las Casas was one of the clergymen who attended him thither, with a view of settling in that island. On the reduction of Cuba, he was obliged to take the rectory of Zaguarama in this island. Adopting the opinion which was prevalent at this time among the ecclesiastics, and particularly among the Dominicans, that it was unlawful to reduce the natives to servitude, he concurred with them in exclaiming against the

"repartimientos," or distributions which were made of them by the governor as slaves to their conquerors. In order to demonstrate the sincerity of his conviction, he relinquished his share in the distribution, declaring that he should ever bewail his own misfortune and guilt, in having exercised for a moment this impious dominion over his fellow creatures. From that time he became the avowed patron of the Indians, and by his active interposition in their favour contributed to restrain the excesses of his countrymen. Actuated by a laudable zeal in their cause, he set out for Spain in 1516, for the purpose of stating their distressed situation to king Ferdinand and intreating his compassion in their favour. This monarch, being in a declining state of health, was much impressed by the eloquence of Las Casas, and promised to adopt means for redressing the evil of which he complained and the guilt of which he forcibly charged on Ferdinand himself. Death, however, prevented him from executing his resolution. Las Casas, with unabated ardour, determined to lay their case before Charles of Austria, who was then in the Low Countries, but whilst he was preparing to set out for Flanders, the regent, Cardinal Ximenes, with the vigour peculiar to his character, adopted a plan for accomplishing the object which the benevolent ecclesiastic had in view; and accordingly he resolved to send out three respectable commissioners, with ample powers to examine all circumstances upon the spot, and to decide finally with respect to the point in question. As the Dominicans and Franciscans had already espoused opposite opinions in this controversy, he excluded both these fraternities from the commission, and restricted his choice to the monks of St. Jerome. Having selected three persons, whom he deemed equal to the charge, and joined to them a private lawyer of distinguished probity, Las Casas was appointed to accompany them, with the title of "Protector of the Indians." Upon their arrival at St. Domingo, they began to execute their commission by liberating all the Indians, who had been granted to the Spanish courtiers, or to any person not residing in America. This measure excited a general alarm; but the fathers of St. Jerome proceeded with prudence and caution; and finding it necessary to tolerate the "repartimientos," they used their utmost endeavours to prevent the injurious effects of this establishment, and to secure to the Indians the best treatment that was compatible with their state of servitude. For this purpose they enacted several useful regulations. Las Casas, however, was dissatisfied, and remonstrated against that unhallowed timid policy, which led them to accommodate their conduct to the state of the colony, and to tolerate what was unjust, because it was beneficial. The commissioners adhered to their system; and Las Casas, in order to avoid the effects of the resentment which he had excited among the Spanish planters, was under a necessity of seeking an asylum in a convent. Perceiving that all his efforts in America were fruitless, he soon set out for Europe, with a fixed purpose not to abandon the protection of a people whom he deemed to be cruelly oppressed. Upon his arrival, he found Ximenes dying; and soon after Charles V. took possession of the Spanish government, which he chiefly committed to his Flemish ministers. Las Casas interested them in his cause, and induced them to recal the fathers of St. Jerome, and to appoint a chief judge to re-examine the points of controversy between the friends of Indian liberty, and the colonists. Whilst Las Casas was thus zealously promoting a scheme, suggested by humanity and a liberal policy, for the emancipation of Indian slaves, he was betrayed by the ardour with which he prosecuted his purposes into the inconsistency of extending the miseries of servitude to the inhabitants of Africa. Accordingly,

cordingly, in order to furnish the Spanish planters with labourers, instead of those Indians whom he wished to emancipate, he proposed to purchase a sufficient number of negroes from the Portuguese settlements on the coast of Africa, and to transport them to America, that they might be employed as slaves in working the mines, and cultivating the ground. Thus, while he contended earnestly for the liberty of the people born in one quarter of the globe, he laboured to enslave the inhabitants of another region; and in the warmth of his zeal to save the Americans from the yoke, pronounced it to be lawful and expedient to impose one still heavier upon the Africans. Unfortunately for the latter, Las Casas's plan was adopted. Charles V. granted a patent to one of his Flemish favourites, containing an exclusive right of importing 4000 negroes into America. He sold his patent to some Genoese merchants for 25,000 ducats, and they were the first who brought into a regular form that execrable commerce for slaves between Africa and America, which has since been carried to such an amazing extent. Las Casas, however, connected with his very censurable plan of enslaving Africans the much less exceptionable project of supplying the new settlements in Hispaniola and the other islands with a sufficient number of labourers and husbandmen, who should be allowed by suitable premiums to remove thither. This scheme was countenanced by the Flemish ministers, but defeated by the bishop of Burgos, who thwarted all the projects of Las Casas. Las Casas, despairing of procuring any relief for the Indians in those places where the Spaniards were already settled, formed an idea of establishing a new colony; and with this view, he applied for a grant of the unoccupied country, stretching along the sea-coast from the gulf of Paria to the western frontier of that province now known by the name of Santa Martha. He proposed to settle there with a colony composed of husbandmen, labourers, and ecclesiastics. He engaged, in the space of two years, to civilize 10,000 of the natives, and to instruct them so thoroughly in the arts of social life, that, from the fruits of their industry, an annual revenue of 15,000 ducats should arise to the king; and in 10 years he expected that his improvement would be so far advanced as to yield annually 60,000 ducats. In forming this scheme Las Casas had evidently conceived ideas concerning the method of treating the Indians, similar to those by which the Jesuits afterwards carried on their great operations in another part of the same continent. After encountering much opposition from the bishop of Burgos and the council of the Indies, he at length obtained a territory of 300 miles along the coast of Cumana, with liberty to extend it as far as he pleased towards the interior part of the country. However, with all his efforts, he could not prevail on more than 200 persons to accompany him, with whom he failed, in 1521. Several of these died or left him at Porto Rico, where he first landed; and with the few that adhered to him, he proceeded to Cumana, which he found much distressed on account of a recent invasion of the Spaniards. He was therefore under a necessity of repairing to Hispaniola in order to solicit succours; but during his absence, the natives, exasperated by the injuries they had suffered, attacked the enfeebled colonists, destroyed many of them, and obliged the rest to take refuge in the island of Cubagua. Soon after this island was abandoned, and not a Spaniard remained in any part of the continent, or adjacent islands, from the gulf of Paria to the borders of Darien. Las Casas, ashamed to shew himself after such a succession of disasters, and after this fatal termination of all his splendid schemes, shut himself up in the convent of the Domini-

cans at St. Domingo, where he assumed the habit of the order and devoted himself to the performance of religious duties. Frustrated in all his projects for the benefit of the oppressed Indians, he nevertheless not only retained his former anxiety and zeal for their relief, but an increased knowledge of their sufferings had augmented its ardour. In 1542, he was sent by a chapter of his order at Chiapa to Madrid, and he took this occasion of pleading their cause before Charles V. and inculcating his favourite maxims concerning the proper mode of treating them. Not confiding for success in the powers of his oratory alone, he enforced them by composing his famous treatise entitled "*Brieve Relation de la Destruction des Indes*," in which he related, with many horrid circumstances, probably exaggerated by his powers of description, the devastation of every province, which had been visited by the Spaniards. This treatise excited throughout Europe a detestation of the cruelties practised by the Spaniards in America; and Las Casas so far succeeded with the Spanish court, as to induce them to adopt several new regulations which he proposed, and which contributed in a considerable degree to alleviate the sufferings of the oppressed natives. With a view to their further relief and protection he accepted the dignity of bishop of Chiapa, and returned thither in 1544. Having continued in his see till the year 1551, he left it on account of his declining health, resigned his bishopric into the hands of the pope, and retired to Madrid, where he finished his course of active and indefatigable benevolence in 1566, at the advanced age of 92 years. Besides his work on the destruction of the Indians, he wrote a Latin treatise on the question, "Whether sovereigns may in conscience, by virtue of any right, alienate their subjects from their crown, and transfer them to the dominion of any other lord?" Tubing. 1625, 4to. In this treatise he discusses, with singular freedom, many points of a delicate nature respecting the rights of sovereigns and people. He also composed many other works, which have never been published, among which is "*A General History of the Indies*," of which Antonio de Herrera is said to have availed himself in the compilation of his history. Moreri. Robertson's *Hist. of America*, vol. i. and vol. iii.

CASASA, or CAÇAÇA, in *Geography*, a sea-port town of Africa, in the kingdom of Fez, at the mouth of a large river in the Mediterranean; 18 miles S. of Melilla. N. lat. 35° 8'. E. long. 32° 41'.

CASATI, PAUL, in *Biography*, a learned Jesuit, was born at Placentia in 1617, and became a professor of mathematics and theology at Rome. He was one of the two Jesuits who attended Christina queen of Sweden at her request, and proselyted her to the Roman Catholic religion. Upon his return to Italy, in 1652, he was superior over several houses of his order, and occupied the first dignity in the university of Parma for two years; in which city he died in 1707. He composed the following works: "*Vacuum proscriptum*;" "*Terra machinis mota*;" "*Fabrica et uso del compasso di proportionione*;" "*Mechanicorum libri viii*;" "*De Igne*;" "*Hydrostaticæ dissertationes*;" "*Opticæ disputationes*," written at 88 years of age, after he was blind: "*Problemata ab anon. geom. Ludg. Batav. proposita, a Paulo Casato explicata*."

CASAUBON, ISAAC, an eminently learned critic and commentator, was born in 1559, at Geneva, whither his father retired to escape persecution, and received his early education at Crest in Dauphiné, under his father, where he was settled as minister, when the persecution ceased. So rapid was his proficiency, that, at the age of nine years, he

was able to speak and write Latin with fluency and correctness. But, on account of his father's frequent absence, he so far lost the ground which he had gained, that, at the age of 12 years, he was obliged to recommence his studies. In 1578, he was sent to Geneva, where he made such progress in the Greek tongue under Francis Portus of the isle of Candy, the Greek professor, that, in 1582, he was appointed to succeed him. At the age of 25 years he published his notes on "Diogenes Laertius," which were added, in 1594, to the 8vo. edition of Henry Stephens. His "Lectures on Theocritus," were published at Geneva in 1584, 12mo. and dedicated to H. Stephens, whose daughter he married in 1586, by whom he had 20 children. These notes were likewise published under the assumed name of "Hortibonus," synonymous with Casaubonus, because *Casau*, in Dauphiné, means a garden; which he preferred to his own as more suitable to a Latin book. In 1587, he published his "Strabo" at Geneva, fol.; and in the same year his edition of the New Testament with notes, afterwards inserted in the "Critici Sacri." Having studied philosophy and civil law under Julius Pacius, he also applied to the oriental languages and Rabbins. His notes on "Dionysius Halicarnassensis," were published at Geneva, in 1588, fol.; and his "Polyænus's Stratagemata," at Lyons, in 1589, 16mo. His "Aristotle," in Greek and Latin, was printed at Lyons, in 1590, and reprinted at Geneva, in 1605, fol.; and in the following year he published an edition of "Pliny's Letters," with notes, and the ancient "Panegyrics," Genev. 12mo. His "Theophrastus's Characters," 12mo. was published at Lyons, in 1592, with a Latin version and commentary, and a third more correct edition appeared at Lyons, in 1612, 12mo. His "Apuleius's Apology," appeared in 1594, 4to. dedicated to Joseph Scaliger; and his "Commentary on Suetonius," was printed at Geneva, in 1596, 4to. and another enlarged and corrected edition was printed at Paris, in 1610, fol. Dissatisfied with his situation at Geneva, he removed to Montpelier, in 1596, and accepted the office of professor of the Greek and of polite literature; but here he was so much disappointed in his expectations of encouragement and support, that he thought of returning again to Geneva. However, in 1598, he removed to Lyons, with the view of printing his edition of "Athenæus's Deipnosophistæ," which was published in 1600, and again in 1612, in 2 vols. fol.; and in the mean while he accompanied M. du Vicq to Paris, where he was introduced to king Henry IV. and whose invitation to the office of professor of polite learning he accepted, in 1599. But jealousy, on the part of the other professors, and his own adherence to the Protestant religion, rendered this office untenable. In 1600, he was one of the judges on the side of the Protestants at the conference held at Fontainebleau, between Cardinal du Perron and du Pleffis-Mornay, and by his conduct on this occasion he led some persons to expect that he would become a convert to popery; but though he was no zealot in religion, he invariably declined complying with the solicitations of his Roman Catholic friends, who wished him to change his profession. The king, who had conferred upon him a pension, promised him also the reversion of the post of his librarian, which office he obtained in 1603, together with an increase of his pension. At this time he published several works of the ancients, viz. "Historiæ Augustæ Scriptores cum Commentario," Paris, 1603, 4to.; "Diatriba ad D. Chrysostomi Orationes," published in Morel's edition of that author at Paris, 1604, fol.; "Persii Satyræ ex recensione et cum Commentariis I. Casauboni," Paris, 1605, 8vo., and London, 1647, 8vo. of which Joseph Scaliger says, that in this edition "the

saucis is worth more than the fish;" "De Satyricâ Græcorum Poesi, et Romanorum Satyrâ, lib. ii." Paris, 1605, 8vo.; in which work he maintains that the satirical poetry of the Latins was very different from that of the Greeks; an opinion which was attacked by Daniel Heinsius, and vindicated by Ezekiel Spanheim: and "G. Nysseni Epistola ad Eustathiam, Ambrosiam, et Basilissam, Gr. et Lat. cum notis I. Casauboni," Paris, 1606, 8vo. and Hanaw, 1611, 8vo.; which letter was first published by him. In 1607, he composed his treatise "De Libertate Ecclesiasticâ," 8vo.; which was occasioned by the disputes that had occurred between pope Paul V. and the republic of Venice, and contains a vindication of the rights of sovereigns against the pretensions of Rome; but these disputes being adjusted whilst the work was printing, it was suppressed by order of king Henry IV. His edition of "Polybius," to which is annexed "Æneas Tacticus de tolerandâ obsidione, Gr. et Lat." was published at Paris in 1609, fol. His Latin version of both these authors was much approved; and the dedication to Henry IV. is reckoned among the masterpieces of modern Latin composition. The best edition of his letters "H. Casauboni Epistolæ, &c." containing also his prefaces, dedications, poems, &c. with those of his son Meric, is that by Almelooven, Rotterdam, 1709, fol. In consequence of several conferences which he held with cardinal du Perron on the subject of religion, a report was spread that he had promised to abandon the Protestant faith, which he thought it necessary publicly to contradict: and his uniform adherence to his profession sufficiently refutes the charge of indifference to religious doctrines, which has been alleged against him. Although he was persevering in his attachment to his own profession, he avoided controversy, and in his opinion, with regard to those who differed from him, he was liberal and tolerant. When one of his sons became a capuchin, and afterwards sought his blessing, "I give it you," says he, "with all my heart; I do not condemn you, neither do you condemn me: we shall both appear at the tribunal of Christ." As a farther evidence of the liberality of his sentiments, and love of peace, it is alleged, that he was one of those who thought an union between the Papists and Protestants to be both practicable and desirable; and in this opinion he concurred with the learned Grotius and many others of the age in which he lived. His attachment to his own profession, notwithstanding his liberality, was evinced by the uneasiness he felt on occasion of his eldest son's becoming a proselyte to the Catholic religion. After the death of Henry IV., an event which he much lamented, he determined to comply with the repeated invitation of James I. to visit England; and, accordingly, in 1610, he accompanied sir Henry Wotton hither, and was received with great civility by the king and many other persons of learning and distinction. Upon his arrival, he was made a denizen, liberally pensioned, and presented to a prebend at Westminster and another at Canterbury. In return for these favours he was engaged by the king, much against his own inclination, in controversial writings against the Papists. Accordingly, his confutation of Baronius's Annals, or "Exercitationes contra Baronium," was published at London, in 1614, fol. at Franckfort, in 1615, 4to., and at Geneva in 1655 and 1663, 4to. He did not live long after the completion of this work; for he died of a singular and painful disease of the bladder, of which sir Theodore Mayerne has given a particular account in his medical writings, in 1614, in the 55th year of his age. He was interred in Westminster Abbey, and a handsome monument was erected to his memory by Thomas Morton, bishop of

of Durham. The laudatory epitaph, inscribed upon it, closes with these lines:

"Qui nolle vult Casaubonum,
Non faxa, sed chartas legat,
Superfuturas marmoris,
Et profuturas posteris."

Casaubon's character was that of a modest, candid, upright man, though somewhat restless and querulous in his temper. As a critic, he is always ranked among the first, and his numerous publications, the principal of which we have recounted, afford sufficient evidence of his indefatigable industry and extensive erudition. *Gen. Dict. Biog. Brit.*

CASAUON, MERIC, son of Isaac, the subject of the preceding article, was born at Geneva in 1599, and, accompanying his father to England, in 1610, finished his education at Christ-church college, Oxford, where he took the degree of M. A. in 1621, and acquired the reputation of extensive learning. At the age of 22, he published a book, vindicating his father against the calumnies of the Roman Catholics, and entitled "Pietas contra maledicos Patrii Nominis et Religionis Hostes," 8vo. This was followed, three years after, viz. in 1624, by a second vindication of his father, "Vindicatio Patris adversus Impostores, &c." written by command of king James I. and occasioned by a publication of the same year, entitled, "The Original of Idolatries, or the Birth of Heresies, &c." falsely ascribed to I. Casaubon. About this time he was promoted to the rectory of Bledon in Somersetshire; and, in 1628, by the interest and recommendation of bishop Laud, he was made prebendary of Canterbury. This prelate, upon his own advancement to the see of Canterbury, gave Casaubon two vicarages in the isle of Thanet, and, in 1636, he was created doctor in divinity by mandate of king Charles I.; but, during the heat of the civil wars, about the year 1644, he was deprived of his preferments, fined, imprisoned, and reduced to extreme indigence. In these circumstances he declined accepting some advantageous offers that were made him in 1649, on condition of his undertaking to write the history of the late war; and he also rejected an invitation that was conveyed to him soon after by the Swedish ambassador from queen Christina, to superintend the universities in her kingdom. On the restoration he recovered his preferments, and, in 1662, exchanged one of his vicarages for the rectory of Ickham near Canterbury. He died in 1671, and was buried in the cathedral of that city. His literary character was that of a general scholar, but by the aid of his father's rules and papers more skilled in criticism than in any other department of literature. In private life he was distinguished by his piety and charity, and by the courteousness of his disposition and manners. Of his publications the principal are as follow: viz. "Optati Libri VII. de Schismate Donatistarum," 1632, 8vo.; "A Treatise of Use and Custom," Lond. 1638, 8vo.; "The Use of Daily public Prayers in three Positions," Lond. 1641, 4to.; "Marci Antonini Imperat. de seipso et ad seipsum, &c. with Xylander's Version, &c. Gr. & Lat." Lond. 1643, 8vo.; also, "An English Translation of this Work, with Notes, &c." 1634; "De Verborum Usu, et accuratæ eorum Cognitionis Utilitate Diatriba," Lond. 1647, 8vo.; "De quatuor Linguis Commentationis, Pars I." comprehending the Hebrew and Saxon, but left incomplete as to the Greek and Latin; Lond. 1650, 8vo.; "Terentius, cum Notis T. Farnabii in quatuor priores comœdias, et M. Casaub. in Phormionem et Hecyram," Lond. 1651, 12mo.; "Some Annotations on the Psalms and Proverbs," inserted in one of the latter editions of the "Assembly's Annotations on the Bible;" "In Hieroclis Commentarium de Providentia et Fato, Notæ Vol. VI.

et Emendationes," Lond. 1655, 8vo. and 1673, 8vo.; "A Treatise concerning Enthusiasm, as it is an effect of Nature, but is mistaken by many for either Divine Inspiration, or Diabolical Possession," Lond. 1655, 8vo.; a work highly commended by sir William Temple, as a happy attempt to account for delusions upon natural principles, though it has been observed, that the author was too much inclined to credulity and superstition to discuss this subject philosophically, which appears from his "True and faithful relation of what passed for many years between Dr. John Dee and some Spirits," in the preface to which he attempts to confirm what is said in that relation concerning spirits, Lond. 1659, fol.; and also in his work "Of Credulity and Incredulity in Things Natural, Civil, and Divine; wherein the Sadducism of these Times in denying Spirits, Witches, and supernatural Operations, is fully confuted," &c. Lond. 1668, 8vo. 1670, 8vo. 1672; "De Nupera Homeri Editione Lugduno-Batavica Hackiana, &c." Lond. 1659, 8vo. reprinted in Almelooven's edition of Casaubon's letters; "Epicteti Enchiridion et Cebetis Tabula, Gr. & Lat.," Lond. 1659, 8vo.; "An English Translation of Lucius Florus's History of the Romans, with Notes," Lond. 1659, 8vo.; "A Vindication of the Lord's Prayer, &c." Lond. 1660; "Notæ et Emendationes in Diogenem Laertium, &c." annexed to the editions of Laertius, printed in Lond. 1664, fol. and Amst. 1692, 4to.; "Of the Necessity of Reformation in and before Luther's Time, &c." Lond. 1664, 4to.; "Notæ in Polybium," first printed in Gronovius's edition, Amst. 1670, 8vo.; and "Epistolæ, Dedications, &c." annexed to I. Casaubon's letters by Almelooven. Besides the works above recited, M. Casaubon wrote several other pieces, learned, controversial, &c. which it is needless to enumerate. He also left, by will, a great number of MSS. to the university of Oxford. His English style is harsh and perplexed, and much intermixed, according to the custom of the time, with Greek and Latin. *Gen. Dict. Biog. Brit.*

CASAVOLI, in *Geography*, a town of Naples, in the province of Bari; 14 miles S.W. of Monopoli.

CASBA, a town of Africa, in the kingdom of Tunis, which was once a Roman colony, is situated on a large, fertile plain, about 25 or 30 miles S. of Tunis. The walls of this town are still standing, though it has been almost destitute of inhabitants ever since it was destroyed by the Turks.

CASBIA, in *Ancient Geography*, a town of Asia Minor, in Lycæonia. Ptolemy.

CASBIN, in *Geography*, a city of Persia, in the province of Irak Agemi, is situated in an extensive pleasant plain, about 3 leagues from the noted mountains of Aluvend or Elwend. It was formerly a very considerable city, being about six miles in circumference, and containing 12,000 houses, occupied by 100,000 inhabitants; but it has been so reduced by the civil wars of the country, that, in Hanway's time, its number of houses did not exceed 1100. Its beautiful palaces are now in ruins, its walls are destroyed, and it has neither garrison nor forts to defend it. The Hippodrome, or Royal Piazza, was 700 paces long, and 250 broad. Its situation for commerce is, in many respects, advantageous, as it lies open to Georgia, Adirbeitzan, and the Caspian sea. Its adjacent territory produces excellent grapes, some of which yield a strong wine, and others are dried, and sent with other fruits to all the provinces of the country. In its vicinity are found yellow orpiment and copper ore. In the 16th century Shah Tahmas, unable to defend Tauriz against the Turks, retired to Casbin, which he established as the capital city of his empire; but Abas the Great transferred this dignity to Isphahan. The European geographers assert

that Casbin is the ancient Arfaria; but the Persian historians will not allow it to be so ancient. N. lat. $36^{\circ} 33'$. E. long. $49^{\circ} 33'$.

CASBUONA, a town of Naples, in the province of Calabria Citra; 5 miles W. of Strongoli.

CASCABLE, the hindermost part of the breech of a cannon from the base-ring to the end or extremity of the knob or button. See CANNON.

CASCADE, a steep fall of water, from a higher into a lower place.

The word is French, formed of the Italian *cascata*, which signifies the same; of *cascare*, to fall; and that from the Latin *cadere*.

Cascades are either natural, as that of Tivoli, &c. or artificial, as those of Versailles, &c. and either falling with a gentle descent, as those of the Sceaux; in form of a buffet, as at Trianon; or down steps, in form of a perron, as at St. Clou; or from bason to bason, &c.

A natural cascade, falling with a great noise, is more properly called a *cataract*, which see.

In a military sense *cascade* signifies, in hollowing out, or digging galleries or mines, a sinking down into the earth by a fort of step below the common level, or a rising above the same in like manner. When a miner rather sinks deeper into the ground or rises up higher by means of such steps at different distances, or turns, he is said to proceed by cascades, or to *cheminer par cascades*.

CASCADE of fire. See PYROTECHNY.

CASCADE point, in Geography, a cape on the western coast of New Zealand, in the South Pacific ocean. S. lat. $44^{\circ} 5'$. E. long. $189^{\circ} 4'$.

CASCAES, a sea-port town of Portugal, on the N. side of the mouth of the Tagus, situate on a slip of land under which ships may lie; 5 leagues W. of Lisbon. N. lat. $38^{\circ} 44'$. W. long. $9^{\circ} 33'$. Cape Cascaes lies $2\frac{1}{2}$ miles S.W. of the town.

CASCANS, in French *cascanes*, holes sunk in the ground in the form of pits or wells, near the ramparts, from which galleries are carried under ground, either to mines of your own, or to give vent to those of the enemy. Cascans also denote a kind of cellars made under the capitals of a fortification.

CASCANTE, in Geography, a small town of Spain in Navarre; 2 leagues from Tudella. Its ancient name was Cascantum, and it was a municipal town. Ptolemy attributes it to the Vasconi. It was situated near the Iberus; S.E. of Calaguris.

CASCARILLA, in Botany. See CROTON *cascarilla*.

CASCARILLA, in the *Materia Medica*, is placed by Dr. Cullen in the class of tonics. It approaches, he says, to the aromatics by its essential oil; but its bitter, to be extracted either by water or spirit, is its most considerable part. It was introduced in the 17th century as a medicine of great value, both in continued and intermittent fevers; and the Italians, fond of any thing as a substitute for the Peruvian bark, against which they had declaimed, employed the cascarilla in their practice and adduced many testimonies of its efficacy: but these testimonies have not been supported by succeeding practitioners, and in this country particularly it has been found a weak substitute for the Peruvian bark. In several trials it has entirely failed. Bergius, though he attests its inefficacy in fevers, recommends it in hæmoptysis. But Dr. Cullen observes, that in hæmorrhages of all kinds it seems to be rather hurtful, as might be inferred from its aromatic and bitter qualities, while it does not in any instance manifest an astringent power. Its tonic and stomachic power may be allowed; but in these respects its virtues are not pe-

culiar nor considerable: nor is there any just foundation for the prejudices which the German physicians have conceived in its favour. Cullen, *Mat. Med.* vol. II. p. 89. It has, however, maintained its place in our Pharmacopœias. The *extract of Cascarilla*, prepared in the same manner with that of Cinchona (which see), has been lately introduced into the London Dispensatory, as a medicine of considerable use, and serving as a tonic in dyspepsy, debility of bowels, and in some circumstances of epidemic fevers. It may be given from 10 to 20 grains, two or three times a day. The *tincture* of cascarilla, prepared by digesting four ounces of powdered cascarilla in two pints of proof-spirit of wine with a gentle heat for eight days, and straining it, is given in debility of the stomach and bowels, and may be substituted in some cases for the tincture of cinchona.

CASCE, CASICA, or CASICE, in *Ancient Geography*, a town of Asia in Aria. Ptolemy.

CASCHARA, a town of Asia, in Mesopotamia, garrisoned by the Romans to guard their frontiers.

CASCHAU, CASSOVIA, KASSA, or KOSSICE, in Geography, the capital of Upper Hungary, a royal free town seated on the river Hernath, or Hundert, surrounded with a triple wall, a moat, and a bulwark, and furnished with a good arsenal. It is a well built place and the seat of a tribunal. The wine, beer, and ale of this town are very bad. In 1400 it was besieged in vain by the Poles. In 1535, king John took it by stratagem, and in 1556, it was destroyed by fire. In 1604, its large and beautiful parish church was taken from the Lutherans, upon which, and in consequence of other oppressive measures, the Caschians were so incensed that they took part with Stephen Botskay, who died here in 1606. In 1616, it surrendered to Bethlen Gabor; in 1644, to George Rakotzy; in 1681 to Tokoly; and in 1685, to the Imperialists. Its university was suppressed in 1782. It is distant 100 miles S. from Cracow, and 124 N.W. from Clausenburg.

CASCHIVE, (Mormyrus Caschive), in Ichthyology, the name under which Hæsselquist describes the Linnæan *MORMYRUS anguilloloides*, which see.

CASCHOU, in Botany, Merian, Surin. See ANACARDIUM *occidentale*.

CASCO-BAY, in Geography, a bay of North America, in the district of Maine, which spreads N.W. between Cape Elizabeth on the S.W. and Cape Small point on the N.E. Within these points, which are about 40 miles apart, are about 300 small islands, some of which are inhabited, and almost all more or less cultivated. The land in these islands, and on the opposite coast on the main, is the best for agriculture on the sea-coast of this country. Casco includes several bays. Maquoit bay lies about 20 miles N. of Cape Elizabeth. On the E. side of this cape is the arm of the sea called *Stroud-water*. Farther to the E. is *Presumpscot* river, formerly called Presumpca, or Presumpkeag, which rises in Sebago pond. This river opens to the waters of Casco-bay on the E. of Portland, and upon it are several valuable mills. Royal's river, called by the natives Westecutgo, falls into the bay six miles from Presumpscot river. It has a good harbour at its mouth for small vessels; and has upon it several mills; but two miles higher a fall obstructs the navigation. Between it and Kennebeck there are no rivers: some creeks and harbours of Casco-bay extend into the main land, affording harbours for small vessels, and intersecting the country in various forms. N. lat. $43^{\circ} 40'$. W. long. $70^{\circ} 10'$.

CASCUMPAC Harbour lies on the North coast of the island of St. John in North America. N. lat. $46^{\circ} 45'$. W. long. $63^{\circ} 55'$.

CASE, sometimes denotes a vessel or receptacle in form of a tomb, commonly decorated with gold and silver, wherein the body of a saint, or some relics of it, are preserved.

In which sense, the word is formed from the French *chasse*. Originally these cases were made in the figure of little Gothic churches, pursuant to that ancient Christian maxim, that the saints, having been the living temple of the Holy Ghost, are entitled, after their death, to have their bones enclosed in the figure of the visible house of God.

The case of St. Genevieve is never brought down without great ceremony, nor except in time of extreme public dangers or calamities.

CASE, JOHN, M. D. in *Biography*, was born at Woodstock, where he received the rudiments of his education. In 1564, he was elected scholar, and in succession, master of arts, and one of the fellows of St. John's college, Oxford. Wood celebrates him for his skill in disputation, in which he is said to have excelled all his cotemporaries. Marrying some time after, he was permitted by the chancellor to read lectures to the students, in logic and philosophy. He also wrote, for the use of his pupils, short treatises on Aristotle's organon, ethics, politics, æconomics, and physics. One of them, "Sphæra Civitatis sive de Politia," printed in 4to. in 1588 by Barnes, having been pirated on the continent, and copies coming over, Barnes obtained an order, obliging every scholar in the university to take one of his books. In 1589, he was made doctor in medicine, and the same year, prebendary of North Aulton, in the church of Sarum. He was much respected, both as a physician, and teacher, and acquired, Wood says, a handsome fortune, the greater part of which he left at his death, (which happened on the 23d of January 1599), to charitable uses. He was buried in the chapel of St. John's college, where a handsome monument was erected to his memory. Wood gives a catalogue of his productions, which are now little noticed. Athæna Oxon.

CASE, JOHN, M. D. Granger gives an account of this man. He was a noted astrologer in the time of queen Anne, and succeeded Lilly, who left him possessed of his apparatus, particularly his darkened chamber, and pictures, with which he pretended to shew his customers their absent friends. Case used to exhibit these to his intimates, in the hours of conviviality, laughing at the folly, and credulity of the people. Over his door was written,

Within this place
Lives Dr. Case;

by which distich he probably got more than Dryden did by all his works. Haller also mentions a doctor John Case who published in 1694, "Compendium Anatomicum, nova methodo instructum," 12mo. in which the writer strenuously defends the opinion of De Graaf, that quadrupeds, and all other animals, as well as birds, proceed ab ovo.

CASE, or *Casos*, in *Ancient Geography*, a small island situated S.W. of Carpathos, and N.E. of the isle of Crete.

CASE, in *Grammar*, is understood of the different inflexions or terminations of nouns; serving to express the different states or relations they bear to each other, and to the things they represent. For the reason of the name, see DECLENSION.

There is a great diversity among grammarians, with regard to the nature and number of cases: they generally find six cases even in most of the modern languages, which they call the *Nominative*, *Genitive*, *Dative*, *Accusative*, *Vocative*, and *Ablative*: but this seems only in compliance with their own ideas, which are formed on the Greek or Latin, and which they transfer to other languages.

The truth is, if by case be only meant an occasional change in the termination of the noun, or name, which

seems to be the just idea of case; there will, in this sense, be just as many cases as there are different terminations of nouns in the same number, i. e. in some languages more, in others less, and in others none at all.

Indeed, the generality of authors either have not any precise notion of cases at all, or they wander strangely from that notion: for they always reckon five cases of nouns in the Greek, and six in the Latin: though several of these cases be frequently alike, as the genitive and dative singular of the first declension of the Latin; the dative and ablative plural of the second, &c. the genitive and dative dual of the Greek, &c. So that with these authors the termination is not the sole criterion of the case.

It seems, however, much more agreeable to the principles of grammar, which only considers words materially, to make as many different cases, as there are changes in the terminations of a name; which would free the English, and other modern tongues, from the embarrassment of cases; most of them expressing the various relations, not by changes in termination, as the ancients; but by the situation of the substantive, as in the nominative and accusative cases, or by the apposition of articles and prepositions. On this footing it is certainly wrong to say, v. g. that *of a father*, is the genitive case of *father*; and *to a father*, the dative; for *of* and *to* are no part of the noun *father*; they are no closes or terminations, but articles or modificatives, which shew the different relation of the word *father*. And the same may be said of the cases of nouns, in the French, Italian, Spanish, Portuguese tongues, &c. Nevertheless, the relation of possession, which answers to the genitive case, is often expressed by a different termination of the substantive: "as God's grace," or, as it was formerly written, "Godis grace," the grace of God. So that the English substantives may be considered as having two terminations for cases; that of the nominative, and that of the genitive or possessive case. In this respect it bears some resemblance to the German, which is probably derived from the same Teutonic original. In the Greek and Latin languages, the words *πάτρις* and *patris* are real cases of the words *πάτερ*, and *pater*, and different from those words: and somewhat like this may be said of the Hebrew, Arabic, Armenian, Polish, and German languages; which in the same number admit of changes in the terminations of words: and yet in these languages, cases are different from what they are in the Greek and Latin. The Hebrew names, for instance, are not properly declined by cases, and to be distinguished by any peculiar terminations; but they are determined principally by the construction and meaning of the sentence or discourse in which they occur, or by certain prepositions, or letters serving the purpose of prepositions, prefixed to the respective words, as in the following example:

Nom.	מֶלֶךְ	Rex.
Gen.	הַמֶּלֶךְ	Regis.
Dat.	לַמֶּלֶךְ	Regi.
Accus.	אֶת הַמֶּלֶךְ	Regem.
Vocat.	הַמֶּלֶךְ	ô Rex.
Ablat.	מִן הַמֶּלֶךְ	à Rege.

Hebrew nouns very frequently occur in the oblique cases, although they have no letter or particle denoting these cases; and the letters or particles which make particular cases are frequently connected with other cases. The article *ה*, which grammarians commonly specify as the mark of the genitive, is applied to all the other cases, and chiefly to the vocative. The relation expressed by the genitive case of nouns sometimes occasions an alteration in them; but this alteration, instead of being in the noun governed, as in other languages, occurs in the Hebrew in that which gov-

verns, and this word sometimes loses one of its letters, and sometimes has it changed into another; e. g. מלכי ארץ, reges terræ, instead of מלכים ארץ; and תורת יהוה, lex domini, instead of תורה יהוה. The Masoretic points are changed in the same manner; as דבר שקר, verbum falsitatis, for דבר שקר. See REGIMEN.

The letter ל, which is an abridgment of the prepositions אל, על, or למען, generally denotes the dative, and not rarely the genitive, and it is also joined to the accusative, ablative, and even the nominative. The particle or preposition את, or אות, is connected, not only with the accusative, but with the dative, ablative, and nominative: and the letter מ, which is the preposition מן abridged, is almost always joined to the ablative, and very rarely to other cases. For the changes that express Hebrew pronouns, see PRONOUN. The cases in the Chaldee language are determined in the same manner with those of the Hebrew; either by the sense of the passage in which words occur, or by prefixing the particles ו or י to the genitive, ל to the dative, ית or ל to the accusative, and מ or מן to the ablative. The Syriac differs from the Chaldee only in two points, viz. that the mark of the accusative is ית, and not ית, and that the note of the ablative is מן, and not the abbreviation מ. The cases in the Samaritan language are formed like those of the Chaldee, by prefixing ו to the genitive, ל to the dative, ית, or עס to the accusative, and מן or מ to the ablative. See Mascl's Grammat. Heb.

An ingenious writer suggests that the Greek cases are formed by certain syllables, which constitute no part of the primitive names of things, but were originally short words, having an independent meaning of their own, and retaining that meaning when joined to these names: thus σμῆμα, δῖος, were originally σμῆμα, δῖ; α, and σ; being annexed to mark them as subjects or agents. In ascertaining the precise meaning of the prepositions of, from, to, which are the signs of the Greek cases, he intimates, that though the termination called the genitive case be rendered by of, it means invariably from, beginning, motive; and this appears to be the true signification of the term of, if we regard its etymology, which this author derives from ἀφ, ἀπο, ab, from; although custom seems to have assigned it a different undefinable meaning, it is in all cases resolvable into the sense of from; e. g. a table of wood is a table from wood, wood being the origin, or beginning of it. This is the reason, he says, why some prepositions which signify origin or beginning in Greek, Latin, and French, are rendered in our tongue by of. He adds, that as of signifies beginning, so to means end: for it is taken, as he supposes, from an oriental verb signifying to aim, pursue, or stretch after a thing, and hence denotes the thing or object aimed at. Into Greek the original verb has passed in the form of τεινω or τωω; but in Persian, Latin, German, and Welsh, as in English, it has with little variation in sound, and none in sense, migrated into a preposition. But beginning and end, or if the terms are applied to moral actions, motive and design, are often the same. Hence it is that the force of these two prepositions is expressed in Latin by the same termination, the dative or ablative case. Hence also, in all languages which admit of cases, the dative, ablative, and genitive, have a near affinity to each other; and in Greek, the first language, as this writer imagines, in which the use of cases was introduced, they were all three at first represented by one termination. Jones's Grammar of the Greek tongue, p. 194.

Some writers think, that the relations signified by the addition of articles and prepositions to the noun may pro-

perly be denominated cases, in English; and that, admitting this principle, there are, in our language, as many cases as in the Latin tongue. But Mr. Lindley Murray, in his "English Grammar," (p. 54. ed. 12.) observes, that to this mode of forming cases for our substantives there are strong objections. If an arrangement of this nature were to be considered as constituting cases, the English language would have a much greater number of them than the Greek and Latin tongues: for, as every preposition has its distinct meaning and effect, every combination of a preposition and article with the noun would form a different relation, and would constitute a distinct case. Thus our language would be incumbered with many new terms, and a heavy, as well as useless, load of distinctions. Mr. Murray is of opinion, that although this variety of cases does not at all correspond with the idiom of our language, we may with great propriety admit a case in English substantives, which shall serve to denote the objects of active verbs or of prepositions; and which is, therefore, properly termed the *objective* case. He allows however, that the general idea of case has undoubtedly a reference to the termination of the noun; and yet there are many instances, both in Greek and Latin, in which the nominative and accusative cases have precisely the same form, and are distinguished only by the relation they bear to other words in the sentence. Analogy, therefore, warrants our applying this principle to our own language, as far as utility, and the idiom of it, will admit. It is obvious that in English, a noun governed by an active verb, or a preposition, is very differently circumstanced, from a noun in the nominative, or in the possessive case; and that a comprehensive case, corresponding to that difference, must be useful and proper. The business of parsing, says this ingenious grammarian, and of shewing the connection and dependence of words, will be most conveniently accomplished by the adoption of such a case; and the irregularity of having our nouns sometimes placed in a situation, in which they cannot be said to be in any case at all, will be avoided.

Although it should be maintained, that many of the modern languages have not, strictly speaking, any cases of nouns; yet most, if not all of them, have a kind of case in their pronouns, without which it would be hard to conceive the connection, or syntax of a discourse; and which, therefore, make a necessary part of grammar: e. g. in English *I* and *me*; and in French, *je* and *moy*. See PRONOUN. For the relations expressed by each case, and the mode of denoting them, see NOMINATIVE, GENITIVE, DATIVE, &c. &c.

CASE, in Printing, a large flat, oblong frame, placed aslope, divided into several compartments, or little square cells; in each of which are lodged a number of types, or letters of the same kind; whence the compositor takes them out, each as he needs it, to compose, and make a page, or form.

A frame of cases, in printing, usually consists of two pair, viz. an upper and lower, Roman and Italic. A shallow case shews the letter best, as being least shadowed by the sides of the boxes. A deep case has the advantage of holding a great number of letters, so that the compositor need not distribute so often.

They say, a case, or rather pair of cases, of Greek, of Hebrew, of Pica, &c.

CASE of a silk worm, is a lodge framed within its web, wherein to deposit its ova.

CASE is also used for a certain numerous quantity of divers things: a case of pistols implies a brace; a case of glass, &c. see GLASS.

CASE is also used for a frame furrounding a door, window, or the like. In which sense we say a door-*case*, window-*case*, &c.

CASE, *action upon the*, in Law. See ACTION.

CASE, *special*, relates to a kind of special verdict, in which the jury find a verdict generally for the plaintiff, but subject nevertheless to the opinion of the judge or the court above, on a *special case* stated by the counsel on both sides with regard to a matter of law. This has the advantage over a special verdict, of being attended with much less expence, and of obtaining a much more speedy decision; the *poslea* (which see) being stayed in the hands of the officer of *nisi prius*, till the question is determined, and the verdict is then entered for the plaintiff, or defendant, as the case may happen.

CASE *stated out of Chancery*, respects a question of law in the process of any cause referred by this court to the opinion of the judges of the court of King's Bench or Common Pleas; before whom it is heard, and who certify their opinion to the chancellor in order to a decree.

CASE-*hardening*, a method of preparing iron, so as to render its outer surface hard, and capable of resisting the file, or any edged tool. It is used by file-cutters for coarse files; by gun-smiths, to harden the barrels of guns; and by others, on other occasions.

The process of case-hardening, which is no other than a superficial conversion of iron into steel, depends on the cementation of it with vegetable or animal coals. This treatment converts the external part into a coating of steel, which is usually very thin, because the time allowed for the cementation is much shorter than when the whole is intended to be made into steel. Immersion of the heated pieces into water hardens the surface, which is afterwards polished by the usual methods. Among the receipts given for this purpose are the following: cow's horn or hoof is to be baked, or thoroughly dried and pulverized: to this add an equal quantity of bay-salt; mix them with stale chamber ley, or white wine vinegar. Cover the iron with this mixture, and bed it in the same in loam, or inclose it in an iron box: lay it then on the hearth of the forge to dry and harden: then put it in the fire, and blow till the lump have a red heat, and no higher, lest the mixture be burned too much. Take the iron out, and immerse it in water, to harden. See IRON and STEEL.

CASE-*shot*, are musquet-balls, stones, old pieces of iron, or the like, put up into cases, and so shot out of great guns.

Case-shot is chiefly used at sea, to clear the enemies' decks when they are full of men.

CASEARIA, in Botany, Schreb. 756. Willd. 877. Jacq. Amer. 132. Class and order, *decandria monogynia*.

Gen. Ch. *Cal.* Perianth four or five-leaved, or four or five-cleft; leaves oblong, flat, coloured, widely spreading. *Cor.* none. *Nect.* four or five-leaved; leaflets oblong, obtuse, hirsute, rather erect, half the length of the stamens, and alternating with them. *Stam.* Filaments eight or ten, awl-shaped, rather erect; anthers oblong, incumbent. *Pist.* Germ roundish; style filiform, erect, the length of the stamens; stigma capitate, obtuse. *Peric.* Capsule roundish, obtuse, crowned with the permanent base of the style, one-celled, coriaceous, thick, three-valved. *Seeds* generally more than one, compressed, angular, fixed to the valves, immersed in a soft pulp.

Eff. Ch. *Cal.* five-leaved. *Cor.* none. *Nect.* four or five-leaved. *Stamens* alternate, with the leaflets of the nectary. *Cupf.* berried, three-valved, one-celled; seeds in a soft pulp.

Sp. 1. *C. spinosa*, Willd. 1. (*C. aculeata*; Jacq. Amer.

133. *Samyda spinosa*; Linn. Sp. Pl. 2. Swartz. Obs. p. 179. Poir. Encyc. 11.) "Flowers octandrous; leaves egg-shaped, serrated, smooth; peduncles axillary, one-flowered; branches spinous." A shrub about seven feet high. *Branches* numerous, diffuse, furnished when young with a few distant and solitary spines. *Leaves* an inch and half long, crowded. *Flowers* axillary, clustered; peduncles short, one-flowered; calyx white; leaves oblong, obtuse; filaments awl-shaped; anthers oblong. *Fruit* greenish purple, mucronate at its summit. A native of St. Domingo. 2. *C. nitida*, Willd. 2. Jacq. Amer. 132. Act. Helv. 8. p. 58. fig. 1. (*Samyda crenata*; Poir. Encyc. 12.) "Flowers octandrous; leaves egg-shaped, crenate, smooth; cymes axillary, peduncled." A shrub about fifteen feet high. *Branches* numerous, spreading. *Leaves* from an inch and half to four inches long, alternate, petioled, very variable in size and form. *Flowers* small, whitish; leaves of the calyx obtuse. *Fruit* roundish; pulp scarlet or purple. *Seeds* two, sometimes only one. A native of America in the neighbourhood of Carthage. Perfectly distinct from *Samyda nitida*. 3. *C. hirta*, Willd. 4. Swartz. Fl. Ind. Occid. 2. p. 756. (*Samyda tomentosa*; Swartz. Prod. 68. Poir. 12.) "Flowers octandrous; leaves egg-shaped, serrated, rough with hairs underneath." A shrub seven or eight feet high. *Branches* alternate, cylindrical, a little angular, pubescent. *Leaves* alternate, acute at the summit, a little narrowed at the base, nerved and veined, on very short petioles. *Flowers* axillary and lateral, fascicled, on short peduncles, with membranous scales at their base; calyx four-cleft; segments deeply divided, linear, lanceolate, obtuse, pubescent, whitish, green underneath, permanent; filaments straight, awl-shaped; anthers heart-shaped, erect, yellowish; style trigonous; stigma capitate, a little trifid. *Fruit* oblong, somewhat acuminate. A native of Jamaica. 4. *C. parviflora*, Willd. 5. (*Samyda parviflora*; Linn. Sp. Pl. 1. Poir. 13. S. foliis ovatis cum acumine; Brown, Jam. 217. Arbor bæciferæ, &c. Sloane Jam. 137. hist. 108. tab. 211. fig. 2.) "Flowers decandrous; leaves oblong, acuminate, slightly crenate, smooth on both sides, shining; peduncles crowded, axillary, one-flowered." A shrub. *Branches* diffuse, cylindrical, rather crooked, smooth, blackish brown, sometimes sprinkled with very small oval greyish or yellowish spots. *Leaves* about three inches long, an inch and half broad, alternate, thin, almost membranous, rather pale underneath; with a few lateral, simple, alternate nerves, and reticulated veins; on short petioles. *Flowers* whitish, axillary, solitary, or in small tufts; peduncles not less than half an inch long, simple, cylindrical, upright; calyx deeply five-cleft, smooth, caducous. *Fruit* small, globular; pulp yellowish. A native of Cayenne. 5. *C. parvifolia*, Willd. 6. Jacq. Amer. tab. 85. (Anavinga; Lam. Illuf. Pl. 355. fig. 2. *Samyda parvifolia*; Poir. 14.) "Flowers decandrous; leaves egg-shaped, acuminate, serrated, smooth; peduncles one-flowered, aggregate, lateral." A shrub about fifteen feet high. *Stems* erect. *Branches* diffuse, slender, long. *Leaves* alternate, about an inch long. *Flowers* not axillary; peduncles simple; leaves of the calyx whitish, reflexed, egg-shaped, obtuse; filaments unequal, nearly as long as the calyx. A native of Martinico. 6. *C. sylvestris*, Willd. 7. Swartz. Flor. Ind. Occid. 2. p. 752. (*Samyda sylvestris*, Poir. 15.) "Flowers decandrous; leaves egg-shaped, acuminate, quite entire; branches rod-like; peduncles axillary, crowded." A shrub. *Stems* smooth. *Branches* long, slender, loose, cylindrical. *Leaves* alternate, acuminate to a great length, thin, smooth on both sides, shining, veined, porous when held against the light, on short smooth petioles. *Flowers* twenty or thirty together; peduncles about three

lines long, simple; furnished at their base with small, dry, imbricated scales; calyx very small, whitish; leaves oval, open, pubescent; filaments the length of the calyx; anthers whitish, heart-shaped; germ ovate; style trigonous. *Fruit* about the size of a pepper-corn, reddish. A native of Jamaica. 7. *C. macrophylla*, Willd. 8. Vahl. ecl. 2. p. 32. (*Pitumba guianensis*; Aubl. guian. vol. 2. tab. 385. *Samyda pitumba*; Poir. 16.) "Flowers decandrous, somewhat tomentous; leaves elliptical, acuminate, slightly crenate." A shrub. *Branches* cylindrical, smooth, spotted. *Leaves* from six to eight inches long, more than three broad, petioled, alternate, firm, thick, coriaceous, sprinkled with pellucid dots, smooth on both sides, deep green above, paler and somewhat russet underneath; marked with lateral, curved, deep brown nerves; and with transverse, scarcely reticulated veins. *Flowers* in small axillary branches; peduncles short, simple; calyx small. *Fruit* about the size of a walnut. A native of Cayenne and many other parts of South America. 8. *C. ferrulata*, Willd. 9. Swartz. Flor. Ind. Occid. ii. p. 754. (*Samyda niviana*; Poir. 17.) "Flowers decandrous; leaves ovate-lanceolate, slightly serrated; little branches zig-zag; peduncles axillary, crowded." A shrub. *Branches* smooth, cylindrical, long, covered with a cinereous bark; ramifications scattered, almost filiform, striated. *Leaves* an inch and half long, alternate, a little acuminate, smooth on both sides, bright green above, nerved and veined, on short petioles. *Flowers* whitish, very small, axillary, ten or twelve in a bunch; peduncles about a line long, furnished at their base with small membranous scales; calyx-leaves oval, concave, ciliated; filaments very short; anthers ovate-heart-shaped; style awl-shaped; stigma obtuse. A native of the island of Nevis. 9. *C. hirsuta*, Willd. 12. Swartz. Flor. Ind. Occid. ii. p. 755. (*Samyda hirsuta*; Poir. 18.) "Flowers decandrous; leaves egg-shaped, acuminate, tooth-serrated, hairy, villous underneath; peduncles lateral, crowded." A shrub. *Stems* woody. *Branches* cylindrical, flexible, pubescent. *Leaves* large, alternate, petioled, soft. *Flowers* in small lateral branches, not axillary; calyx-leaves ovate-lanceolate, whitish, pubescent, a little villous; filaments straight, awl-shaped; anthers oval; style trigonous, the length of the filaments. *Fruit* oval, trigonous. A native of Jamaica and Hispaniola. 10. *C. viridiflora*. (*Samyda viridiflora*; Poir. Encycl. 19.) "Leaves ovate-elliptical, smooth, somewhat coriaceous; flowers nearly sessile, axillary, fasciculated." A shrub. *Branches* smooth, cylindrical, long. *Leaves* from four to five inches long, two and a half broad, alternate, membranous, glaucous green, inclining to yellowish, nearly entire, with lateral nerves and reticulated veins, on short petioles. *Flowers* pubescent, greenish, short, with five ovate, rather obtuse segments. A native of the East Indies, described from a dried specimen in the herbarium of La Marck.

CASEARIA ramiflora, Willd. 3. See *ATHENÆA guianensis*. Willdenow is right in his arrangement. This plant is properly a casearia; and the genus *athenæa* of Schreber, (*Iroucana* of Aublet,) ought to be abolished. The number of stamens, it is now allowed, cannot determine a generic character. *C. elliptica* and *ovata*, Willd. 9, 10. See *ANAVINGA lanceolata* and *ovata*.

Professor Martyn has omitted all our species, having inadvertently referred from casearia to samyda, and from samyda back again to casearia.

Poiret has united casearia to samyda, and observes, that these two, anavinga and aquilaria, are all nearly allied, agreeing with each other in the insertion of the stamens into a particular body, attached to the inner part of the calyx near

its base; and differing only in the manner of their insertion, and in the number of the valves and cells of the capsule. The rim into which the stamens are inserted, and which has been usually called a nectary, he thinks is properly a monopetalous corolla, adnate with the calyx, and toothed or divided almost to its base. Into this corolla the filaments are inserted, either loose, as in anavinga, aquilaria, and the original casearia, or adhering, through their whole length, to its teeth, as in the original samyda, and thence giving the anthers the appearance of being sessile. Considered in this point of view, they would form one well-marked genus, having for its essential character "a very short, monopetalous corolla, with the stamens inserted into its tube." It is sufficiently evident from the description of the species of casearia given above, that a monophyllous or polyphyllous calyx can by no means be admitted as generic distinctions. Such an union would, in our judgment, be a real improvement to science, as it would render our ideas of the subject more compact and not less distinct. Though the species at present known are not very numerous, they might be conveniently thrown into separate sections, nearly corresponding with the present genera. The solitary species now constituting the whole of the genus aquilaria would differ the most from its congeners on account of its two-celled, two-valved capsule. See Poiret in Encyc. Method. vol. vi. p. 487.

CASEI DI CAVALLO, the name of a peculiar cheese, famous in Italy, and many other places, and made of the milk of the female buffalo, that species being as commonly tamed and kept there as the ox and heifer with us.

CASEL, JOHN, in *Biography*, a learned German, was born at Gottingen in 1533; and having studied in several universities, travelled to Italy, and was made doctor of laws at Pisa. In 1563 he became professor of philosophy and eloquence at Rostock, and afterwards at Helmstadt, where he died in 1613. He excelled in his knowledge of the Greek fathers; and he warmly opposed Daniel Hoffman and others, who maintained that philosophy is adverse to theology, and that many things are true in the latter which are false in the former. He carried on a correspondence with some of the most eminent scholars of his age; and left many works, both Greek and Latin, in verse and prose. A collection of his letters was printed at Frankfort in 1687, 8vo. Moreri.

CASELLA. We used to imagine that this was only a poetical character in the *Purgatorio* of Dante; but as his commentators call him an ancient Italian musician and composer, he must not be passed without a salutation; particularly as his existence has been acknowledged by *Lemmo da Pistoia*, who flourished in 1300, and in a note to one of his madrigals, preserved in the Vatican library, which says, *Casella diede il suono*, "this madrigal was set to music by Casella."

There is something in the description of this imaginary rencontre so simple and affectionate, that I cannot help wishing to convey an idea of it to my English reader. Dante, after visiting the infernal regions with Virgil, is conducted by the same poet into purgatory; where, soon after his arrival, he saw a vessel approach the shore laden with departed souls, under the conduct of an angel, who brought them thither to be cleansed from their sins, and rendered fit for Paradise: as soon as they were disembarked, says the poet, "they began like beings landed on a foreign shore, to look around them:

"On me when first these spirits fix their eyes,
They all regard me with a wild surprise,
Almost forgetting that their sins require
The purging remedy of penal fire:

When

When one of these advanc'd with eager pace,
 And open arms, as me he would embrace;
 At sight of which I found myself impell'd
 To imitate each gesture I beheld.
 But vain, alas! was ev'ry effort made,
 My disappointed arms embrace a shade:
 Thrice did vacuity my grasp elude,
 Yet still the friendly phantom I pursued.
 My wild astonishment with smiling grace
 The spectre saw, and chid my fruitless chace.
 The voice and form now known, my fear suspend,
 O stay, cried I, one moment with thy friend!
 No suit of thine is vain, the vision said,
 I lov'd thee living, and I love thee, dead.
 But whence this haste?—not long allow'd to stay,
 Back to the world thy Dante takes his way—
 Yet let this fleeting hour one boon obtain,
 If no new laws thy tuneful pow'rs restrain,
 Some song predominant o'er grief and woe,
 As once thou sung'st above, now sing below;
 So shall my soul, releas'd from dire dismay,
 O'ercome the horrors of this dreadful way.
 Casella kindly deign'd his voice to raise,
 And sung how *Love the human bosom sways*,
 In strains so exquisitely sweet and clear,
 The sound still vibrates on my ravish'd ear;
 The shadowy troops, extatic, list'ning round,
 Forgot the past and future in the sound."

CASELLA, *Ital.* a small house, but in *Music* it implies a *bar*, a compartment, containing such a portion of notes as the character or characters for time direct at the beginning of a movement. See TIME, BAR, MEASURE.

CASELLE, in *Geography*, a town of Italy, in the principality of Piedmont, on a small river which runs into the Stura; 6 miles N. of Turin.

CASEMATE, or CASEMENT, in *Architecture*, the same with *cavetto*, denotes a hollow moulding, which some architects make one-sixth of a circle, and others one-fourth.

CASEMATE, from the Spanish word *casamata*, or from the Italian word *casamatta*, in *Military Language*, a low, covered, or concealed house. A casemate may in general be defined to be a subterraneous or covered arched work. Casemates are made in garrisoned places, in order to place the troops of the garrisons, when off from duty, under, from shells, &c. They are also made sometimes under different parts of the rampart of a place with embrasures, for cannon, or loop holes for musquetry.

This name is also given to subterraneous or covered arched works, on that part of either flank of a bastion, which is next to the adjoining curtain made there for placing some guns in, to defend the passage of the moat or ditch, the face of the opposite bastion, and the approaches to any breach that may be made in it. That part of the flank is taken inwards towards the capital of the bastion, that it may be covered from the enemy's or besieger's fire, by the remaining part of it, which, when rounded, is called a round *orillon*, but when left without being rounded, is called a square *orillon*. The part of the flank thus taken inwards is therefore called the retired or covered flank, as also *casemate* and *place basse*; and the side of it next to the curtain is generally in the continuation of the line of defence, which part of the said line is called the *retirade*, or retrenchment of the flank, or the platform of the casemate. The vaults or casemates in this retired flank have commonly the soles or bottoms of their embrasures a little above the terre plain or level of the

place or country, in order that the guns in them may fire over the parapet of the fausse braye, in the ditch before it, if there be any.

Casemated flanks are rarely made use of at present, because the enemy's batteries can generally bury the cannon contained in them under the rubbish and ruins of their vaults, and because the smoke, with which they are always in a short time filled, renders them insupportable to those who serve the guns, notwithstanding all the flues, vents, or air-holes that can be made in them. Besides these inconveniences, musquetry, if they be exposed to its fire, will, within a certain distance, when properly made use of, always silence cannon, whether they be in casemates or not. Engineers, therefore, at present commonly make their retired flanks open at top, and call them low flanks, or *flancs bas*.

A low flank ought to have a horizontal depth or thickness of at least 16 yards; to wit, 3 for its parapet, and 5 for its terre-plain, or rampart behind the parapet, and if there be two of them, they ought together to have a breadth or thickness of at least 32 yards.

Low flanks have several disadvantages. If there be more than one of them in the same flank, they cannot well be made use of at once on account of the flame and flashing of the powder and the rubbish that is constantly tumbling down from one of them into another. They become almost useless when the ravelin is once taken, by reason of the command it has over them, unless they be remarkably well covered by the orillons. And the rubbish which falls down from the higher flanks upon the lower, forms a gentle slope for the enemy to mount on to the assault. The best low flanks, perhaps, are the tenailles, or those parts of the fausse braye of the ditch, that are in front of or opposite to the flanks, and distant from them respectively from 20 to 24 yards.

The chevalier Antoine de Ville, in speaking of the inconveniences and inutility of casemated low flanks, expresses his sentiments thereon in the following words: "Antrefois on faisoit aux flancs des voutes où on mettoit le canon tout couvert, et par dessus ils en faisoient d'autres pour mettre d'autres canons; mais cela n'est plus en usage, à cause des grandes incommoditez, qu'ont à veu arriver en ces places. Car apres qu'on avoit tiré, la fumée remplissoit de telle façon ces voutes, qu'il étoit impossible d'y demeurer dedans, ni rien voir pour recharger, quelques soupiraux qu'on y peut faire, outre que l'étonnement du canon ébranloit tout; et l'ennemy tirant dans ces voutes basses, les éclats et debris bleissoient et tuoient ceux, qui étoient dedans, et en peu de coups les mettoient en ruine. C'est pourquoi on a laissé ces voutes et on fait les places basses decouvertes. Et pour avoir deux places on fait le premiere plus basse un peu par dessus les parapets des fausse-brayes, s'il y en a. Les mesures quant à leur face sont du tiers du flanc, ou de la mortie, comme nous avons dit. Leur profondeur en dedans et de quatre pas, qui sont pour les merlons, six pas pour le dedans à mettre les canons, et trois pour les voutes lorsqu'on les met en ce lieu. La place basse doit aller en elargissant du cote de la courtine afin que le canon, qui est la, puisse etre pointé vers la contrescarpe."

Du cote de la courtine doit etre l'entrée ou voute, qui doit commencer au dedans de la ville, passant par dessous le rampart de largeur et hauteur suffisante pour pouvoir mener par là le canon et munitions."

CASEMENT, is used in building for a little moveable window, usually within a larger, being made to open or turn on hinges. We say, a single casement, a folding casement, a casement

casement with a lock, with a turn-about, or turn-buckle, a casement with a cock-spur or pull-back at the hind-side, wherewith to draw it to.

CASENA, or CASSENA, in *Geography*. See KASSINA.

CASENDORF, a town of Germany, in the circle of Franconia, and principality of Culmbach; 7 miles S.W. of Culmbach.

CASENI, a town of Persia, in the province of Irac; 160 miles E. of Ispahan.

CASEOUS, something that partakes of the nature or qualities of cheese, which see.

CASERNS, in French *casernes*, in *Military Language*, are, strictly speaking, small houses built along by the rampart of a fortified place, for lodging the soldiers of the garrison, in order to render them as little troublesome as possible to the inhabitants. Each casern for the infantry has generally two beds for six soldiers, three and three. One-half of these mount guard whilst the others remain there to secure that quarter. And each casern for the cavalry commonly holds four horsemen. But neither these nor any other casernes that are erected, either adjoining the rampart or partly connected therewith, are carried along any other parts of it than those that are behind the curtains, or lie between the bastions, across the gorges of which they seldom or ever extend.

Casernes signify not only such small houses as we have just been speaking of, but also any buildings or edifice, however large or extensive, erected, and destined for the reception and accommodation of troops. In a city of war, or fortified place, they are commonly constructed between the rampart and the houses of the town or city, as being there most convenient for guarding against and preventing surprises. The casernes or barracks for the infantry should be kept separate from those of the cavalry and dragoons, as they are at Nismes and several other places in France; and the last of these ought to be placed as near as possible to convenient or commodious watering-places for horses. In France, and some other countries on the continent of Europe, these buildings have generally been erected in large towns and cities at the expence of the inhabitants, and in small ones at that of the state. But in this country the expence on all such erections is defrayed by the public. They should as much as is possible, when it can conveniently be done, be placed towards the east, on account of the air. When there is ground enough for the purpose, it is of advantage to inclose with them a square or rectangular space, sufficiently large, not only for parading, but also for exercising the troops. The soldiers are then easily confined to their quarters, and kept out of the way of quarrels, riots, and mischief. They are more observant of order and regularity, being immediately under the eyes of their officers, than they are when distributed among the houses of the inhabitants. And as they then are, as it were, in one body, and the rooms they are lodged in are contiguous to one another, and not far from the apartments of their officers, orders can be executed with more dispatch and privacy than when they are either lodged in separate or detached places, or are billeted and dispersed about among the citizens. In time of war, or during a siege, many inconveniences may arise from having the soldiers scattered about in the houses of the inhabitants of a fortified town or city, instead of having them collected together in one body, or in a few separate and distinct bodies, under the inspection at all times of their officers. In case of any alarm's happening, the governor or commandant of the place cannot assemble the garrison without a good deal of

trouble and a considerable loss of time. Should he wish to send a party or corps out of it either on forties or other duty, he cannot do it without the knowledge of the whole town or city. Such a dispersion of troops tends to render them disorderly, dissolute, and negligent of discipline; whereas the keeping of them together in barracks or casernes, contributes much towards the observance and maintenance of it.

Casernes or barracks are built and constructed differently, according to the situations on which they are placed. When the ground will admit of it, as we have already observed, it is advantageous to inclose with the buildings a square or rectangular space, yard, court, or area sufficiently large for not only parading the troops, but also for all the exercises of detail, and that too for either infantry or cavalry, who ought to be kept separate. For a large court or area is necessary for the one as well as for the other. In such buildings galleries should be carried along their whole extent, to furnish an easy communication between the different rooms or chambers. When they are erected for cavalry, the men ought to be lodged immediately over the stables for their horses.

When barracks are built along by the rampart opposite to the curtains, as marshal Vauban has practised in a good many places, they are generally composed of large bodies of buildings for the troops to lodge in, and at the ends or extremities of them are barracks or pavilions erected for the officers. These barracks or casernes are commonly two stories high, independent of the ground floor or story; and sometimes three.

In every body of double barracks, there are, for the most part, on each story four rooms, each two of which answer to the stair-case next to it. Every room ought to be at least 22 feet long and 18 feet wide, which is a size sufficient for four beds. Those on the ground floor should be not less than 12 feet high, those in the next story 10, and those in the upper story should be at least 8 feet high. The doors ought to be 6 feet 4 inches high, and 3 feet at the least wide. And whether they be built with bricks or stones, the walls ought to be two feet thick or upwards. A fort of *cordon* is sometimes made in the walls, at the upper part of each story, which is useful in helping to preserve the faces or outsidings of them, by preventing water or moisture from running or trickling down them. In the barracks at Woolwich the rooms are too small, being each of them only 16 feet square. There has been no general rule, indeed, either established or observed in this country for such buildings, and the sizes of the rooms or apartments in them.

Though barracks or casernes of any form or description are seldom or ever erected along by those parts of the rampart, where the flanks and faces of the bastions are, as they are along by those that lie between the bastions, yet when these works are empty, instead of being as they generally are, especially such of them as are not likely to form part of any front, that may be attacked by a besieging enemy, it may not only be advisable, but extremely useful, to erect barracks, or casernes, opposite to their gorges, and at some little distance from the same, converting the interior areas or parts of them into gardens to be cultivated by the troops inhabiting those buildings. These would furnish them not only with a considerable proportion of their nourishment, but also with proper and useful exercise, and agreeable walks, without lessening or diminishing in any way, or manner whatsoever, the strength or defence of the place. In fortified towns or cities, however, with enclosures of considerable extent, and large garrisons, the barracks,

racks, or casernes, are generally erected along by the works in different places separate and distinct from one another, but with easy and speedy communications, there being seldom more such buildings in one of those places than what are sufficient for lodging two battalions. In consequence of this precaution, arrangement, and distribution of their garrisons, those entrusted with their defence are less apprehensive of being surprised than they otherwise would be, as the different parts of the works are thereby equally guarded and defended. Such an arrangement, however, is not always made or observed in fortified places. For barracks, that have been formerly erected without any regard to such a distribution, are commonly repaired as long as they are capable of receiving repairs, or being rendered useful. And in Roman Catholic countries old religious edifices and buildings originally erected for pious purposes, which for the most part are agreeably and eligibly situated, are frequently converted into barracks if they happen to be near the gates or principal works.

Whilst the feudal system existed, and chivalry was in repute, the militia, which it supplied in every state or country where it prevailed, formed all the troops that either the barons made use of in their feuds and contentions, or sovereigns employed in the forcible assertion of their claims and pretensions. During the prevalence of that system there was no standing army or regular military establishment either in this country or on the continent of Europe. And as such forces were seldom assembled or brought together but on the spur of the occasion, or at the moment, when they were going to attack, repulse, or engage their enemies; as they very rarely took the field but in mild and seasonable weather and were generally dismissed, before the setting in of winter or the rainy season to return to their respective homes and places of customary abode, it was not necessary to erect barracks for them to lodge in. As the strength of that system became somewhat broken, and the rigour of it began to decline in the time of Charles VII. of France and his contemporaries, he and some others of them, instructed by experience and influenced by mutual example, began the practice of keeping bodies of troops constantly on foot and in pay. From this originated the necessity of considering the best and most advantageous manner of providing habitations or lodgings for them. But as the military establishments under these princes and their successors were but small, even in time of war, and very trifling during peace, the difficulty of procuring lodgings for them was not great. At present, however, when such establishments are much increased and augmented, the best manner of lodging them, either in garrisons and along the frontiers, or in the interior parts of a country, becomes a matter of serious concern to the prince or state.

When troops are to remain for a considerable time in one place there are four different ways, in which they may be lodged or disposed of, namely, in tents, in huts, in barracks, or in the houses of the inhabitants. To make soldiers live constantly either in tents or huts would be preposterous and absurd, as it would operate injuriously to their health and fitness for service when necessary, subjecting them to unnecessary hardships and inconveniences, without any saving or diminution of expence to the nation to which they belong. No question then on this subject remains but between the propriety of keeping them in barracks or the distributing of them among the houses of individuals.

As a soldier is a man, and ought to be regarded as a citizen or member of the community in every country, but more especially in a free one like Great Britain; and is moreover entrusted with the defence of our persons and pro-

perty, some attention should be paid to his comfort and convenience. To preserve, however, public tranquillity during peace, particularly in a nation under an arbitrary or monarchical government, and ensure success to its operations in time of war, soldiers should be subjected to an exact and a rigorous discipline, for the due observance of which they ought to be so disposed of as to be frequently visited and looked at without much trouble or difficulty; to be easily assembled, to have their conduct liable to constant notice and inspection, to have their mode of eating and living daily and properly attended to, and to be able to execute with promptitude and expedition the orders that may be given to them from time to time. But strict attention to these essential circumstances is in a great measure incompatible with their being scattered or dispersed over the whole of a large town or city. For it must certainly be allowed that such a dispersion of them has a great tendency to weaken and destroy discipline, to render them riotous and dissolute, and to create in them a dislike of order and subordination, and a strong inclination for indolence, softness, and ease. In despotic countries, or where mercenaries are partly employed, it is not only destructive of discipline, but extremely dangerous. It is, therefore, a natural and invariable maxim of such governments to keep their troops as separate and distinct as possible from the rest of their subjects, to inspire them with views and sentiments repugnant to theirs and incompatible with civil liberty, and to make them believe, that their interests are not only different from, but opposite to those of the people; as their despotic mandates, oppressive impositions, and arbitrary regulations must be enforced when necessary by the soldiers, and the people must be rendered submissive and obedient to them by the terrors of military execution. In this free country, however, things of this kind ought to be guarded against with the utmost caution and circumspection. Especial care should be taken to prevent the soldiers from forgetting that they are citizens, or from supposing that their interests are in any way distinct from or inconsistent with those of their fellow subjects. It ought to be instilled into their minds, that they are serving and are to fight, not only for their king, but also for themselves, and for their country, her constitution, her liberties, and her laws. An intercourse between them and the people, instead of being prevented or discountenanced, should not only be permitted but countenanced. And they ought never to be confined to barracks to the prevention of such an intercourse, but in certain circumstances, and on certain occasions. Our learned commentator on the laws of England, in expressing his sentiments on this subject, makes use of the following words. "Nothing ought to be more guarded against in a free state than making the military power, when such a one is necessary to be kept on foot, a body too distinct from the people. Like ours, therefore, it should wholly be composed of natural subjects; it ought to be enlisted for a short and limited time; the soldiers also should live intermixed with the people; no separate camp, no barracks, no inland fortresses should be allowed. And perhaps it might be still better, if, by dismissing a stated number, and enlisting others at every renewal of their term, a circulation could be kept up between the army and the people, and the citizen and the soldier be more intimately connected together." Blackstone's Commentaries, book i. page 413. See ARMY.

In attempting any reformation or amelioration of our military establishments we ought never to forget, that Great Britain is an island, and rests not principally on her troops for her defence, that we have seldom or ever any necessary occasion for employing them on the continent, and that it is therefore preposterous and absurd to think of assimilating our military system

in every respect to those of the other nations of Europe, which have no other security, protection, or defence. The maxims, that those employed as the defenders of this island should think of nothing but their muskets, that they should be rendered a sort of mere machines at the risk of undergoing even a degradation of intellect, and that they will not fight the better in defence of it for having stakes in it to lose, are not only ridiculous, but truly abominable. Were not the noblest, the most glorious and most successful struggles in support of freedom and independence, that are recorded in the annals of mankind, made by states who did not even enjoy the immense advantages of our insular situation, who had no separate military establishments, whose troops were their citizens, who after the emergencies that called for their services and exertions were past, returned to their various occupations in society, and to the peaceful pursuits of life? And were not the troops of that people who conquered the world, composed entirely of citizens, who after performing the services they were employed on, returned to mix with the rest of the community? As to the idea of these united islands having a regular standing military force sufficient for enabling us to restore the continent of Europe to an equilibrium, or to prescribe to the different powers in it their relative degrees of strength and territory, it is too extravagant to be entertained by any but the most visionary and wildest of men, who, cherishing such chimeras, lose sight, not only of the constitution of this country, but of every principle and consideration that ought to govern their deliberations respecting her welfare, security and defence.

We will not, like the learned judge, go so far as to assert, that no barracks ought to be allowed. For within works and fortified places, such as Portsmouth and Plymouth, if the latter, indeed, deserves the appellation, they may be proper, allowable, and necessary. But out of such places they ought not, on any account or pretext whatsoever, to be tolerated to any great extent.

In this country there never has been any certain or established rule for the building of barracks, and the relative dimensions of their several component parts. But in France, which has always been a kind of arbitrary government, and is at present a peculiar species of military despotism, ordinances for that purpose were made from time to time. Even in that country, however, such regulations have not been at all times strictly observed or attended to.

CASERTA, in *Geography*, a city of Naples, in the country of Lavora, about 16 miles from the capital, situated at the foot of a lofty ridge of hills and irregularly built. This place is famous for the magnificent palace caused to be erected by Charles III. of Spain, according to the designs of Vanvitelli, and surpassing in size and solidity almost every royal edifice in Europe. The vast dimensions of its apartments, the bold span of their ceilings, the excellence and beauty of the materials employed in building and decorating it, and the strength of the masonry, claim the admiration of all beholders, who must confess it to be a dwelling spacious and grand enough to have lodged the ancient masters of the Roman world. The two principal fronts are 787 feet in length, and contain five stories of 37 windows each. The two other sides are 616 feet long, and consist also of five stories, in each of which are 27 windows. The interior is divided into four courts, and in the centre of the palace is a superb stair-case, crowned by a circular hall which affords a communication to every set of apartments. The richest marbles are displayed with profusion, most of them being dug out of quarries within the realm. The chapel is incrust with pannels of yellow marble. The theatre is a master-piece of art; antique columns

of alabaster support the roof and divide the house into 42 boxes richly decorated, and so arranged as to set off both actors and spectators to the best advantage. The gardens are very extensive, but formed with wide sultry alleys and crowded rows of statues. A broad canal intersects the garden and passes to the hills at the distance of nine miles from the city, where it collects, for the supply of the palace, the streams that in ancient times were conveyed to Capua; and these are conveyed to one regular channel, and conducted by an easy fall along the sinuosities of several vallies. The depth of one hollow, and the height of the opposite ridge of hills, made it necessary to build an aqueduct across for their conveyance. This aqueduct, distant six miles from the city, about two miles in length, and proportionably broad, is an edifice of three stories of arcades, of which the upper one is divided into 43 arches; the two lower ones, on account of the declivity of the hills and contraction of the valley, consist of fewer. From hence the waters are carried in a channel to the cascade near the royal gardens, and pass under the city. The pavement of this aqueduct is formed of calcareous stone, with which the neighbouring mountains abound; and the remainder of the edifice is constructed with volcanic tufa, in which are intermixed some pieces of enamel. Sir William Hamilton informs us, that in the environs of Caserta, below a stratum of vegetable earth four or five feet in thickness, we meet with cinders, pumices, and fragments of lava; and that in digging near the foundation of the aqueduct volcanic earths are discovered. Spallanzani (see his *Travels*, vol. i.), on examining the adjacent country, found that it was wholly calcareous, not excepting the highest mountains, almost all of which were of the same contexture and colour with the chains of hills between Naples and Loretto. This place was at first a hamlet, built by some families that escaped from the ruins of Capua; and from the weakness of its situation it was called *Casa erta*, dreary house. It now seems, says Swinburn (*Travels in the Two Sicilies*, vol. iii.), very likely to relapse into its pristine state by the emigration of its inhabitants, drawn into the plain by the conveniences of the new city and the charms of its court. The monarchs of the country have lately expended large sums in embellishing the environs of Caserta, in planting groves, and building places of rendezvous for hunting. N. lat. 41° 5'. E. long. 15° 5'.

CASES *reserved*, in the *Romish Policy*, are considerable sins, the absolution of which is *reserved* by the superiors to themselves, or their vicars.

There are some cases reserved by the pope, and others by the bishops: in convents some are reserved by the chapter, &c. None but these, or their vicars, can absolve in such cases; except at the article of death, when all reserved cases are absolvable, by the ordinary.

CASH, in *Commerce*, the stock or ready money, which a merchant, or other person, has in his present disposal, to negotiate; so called from the French term, *caisse*; i. e. *chest*, or *coffer*, for the keeping of money. M. Savary shews, that the management of the cash of a company is the most considerable article; and that whereon its good or ill success chiefly depends.

CASH-book. See *Book*.

CASHAN, in *Geography*, a populous and wealthy city of Persia, in the province of Irak-agemi; situate about 98 miles N. of Isfahan, in a large plain near a high mountain, which being opposed to the south is so much affected by the reverberation of the sun's rays in summer as to be intolerably hot. The bazars and baths of this place are elegant structures, and the royal inn founded by Abas the Great, in the suburbs, is the fairest in all Persia. Adjoining to it stands the royal palace,

palace, and opposite to it another, designed for lodging ambassadors. Cashan has various manufactures of all sorts of silks, stuffs, and tissues of gold and silver. N. lat. $33^{\circ} 40'$. E. long. $51^{\circ} 20'$.

CASHEF, or KIASCHEF, in the Turkish government, an officer who acts as lieutenant of the Bey, and who presides over a town or village in Egypt, collecting the revenues and judging in small causes; from whom an appeal lies to the bey. The authority of a cashief is as arbitrary as that of a bey. See BEY.

CASHEL, in *Geography*, a mountain of the county of Galway, Ireland, in the barony of Ballinahinch, which is an important land-mark to those wishing to enter Birturburgh.

CASHEL, a city and post town of the county of Tipperary, Ireland, situated about three miles east of the river Suire. It was anciently a place of great importance and the residence of the kings of Munster, who are supposed to have had a house of stone on the rock in the fifth century. Cormac Mac Cullinan in particular, who was at the same time prince and bishop of Cashel, resided here at the beginning of the 10th century. In 1172 Henry II. of England visited this town, in which he received the homage of Donald O'Brien, king of Limerick, and held a synod by which the supreme lordship of Ireland was confirmed to him, and some ecclesiastical regulations were adopted. Cashel was surrounded by a wall which, though now mouldering, seems, from two gates of tolerable workmanship yet remaining, to have been of better materials than the generality of such enclosures. But its ecclesiastical ruins are those for which Cashel is chiefly distinguished. The chief of these are on the celebrated rock of Cashel, which is seen at a great distance and in many directions, and which of course has a very extensive prospect. The old cathedral appears to have been as large as well as handsome Gothic structure, the dimension of the nave and choir from east to west being about 200 feet. Some have supposed that it was the first stone building in Ireland, but this appears to be mere conjecture. Donald, brother of Morrough, king of Munster, about 1086, is generally recorded as the founder of it, and his grant of lands was confirmed by king John, as appears from an old statute. Sir James Ware, however, was of opinion that it was not built till about the time of the arrival of the English under Henry II. perhaps supposing with that prejudice which blinds many writers, that the Irish were incapable of raising such a structure. Cormac's chapel, the ruins of which join the cathedral, and which is 50 feet by 18, is a very curious structure, of a style of architecture totally different from that of the cathedral, and supposed to have been built by Cormac, about 902, which would be near two centuries earlier. There is also on the rock near the east angle of the north aisle, a lofty round tower, which is 54 feet in circumference and is divided into 5 stories with holes for joints. This tower has a communication with the church by a subterraneous passage, which implies that it was used for some religious purpose. From its having been built of free stone, when the rock and all the other buildings upon it are limestone, Dr. Campbell infers its being of greater antiquity than the rest. The whole rock was inclosed by a wall, within which was the residence of the archbishop; and it is supposed by Mr. Ledwich to have been a *Mandra*, or habitation of a great number of monks. The church being through age in a ruinous condition was repaired by Richard O'Hedian, archbishop, in 1420, and part of it was used as the metropolitan church till 1750, when it was prematurely unroofed by Alexander Pricc, and thus exposed to the effects of the weather. In the unhappy civil war of 1641, the rock having been taken possession of

by lord Taaffe, was stormed by the earl of Inchiquin, and many persons were put to death. Cashel is a tolerably well-built town, containing about 600 houses, but without trade. There is a handsome market-house, a sessions-house, the county infirmary, a charter-school, and a barrack. The church is a new and neat structure, and the archbishop's palace, though plain, is large and commodious. The city is governed by a mayor, recorder, and bailiffs, and it sends a member to the imperial parliament. Distance S.W. from Dublin 77 Irish miles. N. lat. $52^{\circ} 30' 30''$. W. long. $7^{\circ} 5'$. Dr. Beaufort. Campbell's Philosophical Survey. Collectanea de Rebus Hibern. Ledwich's Antiquities, &c. &c.

CASHEL, *Archbishoprick of*, in Ireland; chiefly confined to the county of Tipperary. It was founded or restored by Cormac Mac Cullinan at the beginning of the 10th century; was made an archbishoprick by cardinal Paparo, the pope's legate in 1152, and was united to Emly in 1568. The united sees are very compact, extending 32 Irish miles in length, and 30 in breadth. There are in the union 155 parishes, which make 47 benefices, and have only 35 churches. The cathedral, which serves also for a parish church, is a large and handsome modern edifice, completed by archbishop Agar, who also established a choir. The archbishop is primate of Munster, and ranks next to the archbishop of Armagh and Dublin; his suffragans are the bishops of Killaloe, Limerick, Cork, Cloyne, and Waterford. Beaufort's Memoir.

CASHEL, *Psalter of*, an historical poem, or rather a collection of poems in the Irish language, written by Cormac Mac Cullinan, prince and bishop of Cashel, about 902. This Cormac is mentioned by Caradocus Llancarvanensis in his Chronicle of Wales; and was slain in battle in 908 either by the Leinster forces, or by the Danes. He is represented to have been learned and well skilled in the Irish antiquities, and his psalter is highly valued by many as an authentic record. It has not been published, but part of it, at least, is said to be in the Bodleian library, and has been seen by respectable writers. Extracts from it have been published, and it is often referred to for the events of some centuries preceding. Stillingfleet and Pinkerton have, however, perhaps too rashly, affirmed it to be a collection of poetical fictions, compiled in the 13th century, an opinion adopted by Ledwich. Is it not probable that whilst an unreasonable stress has been laid upon its authority by the advocates of early Irish literature, the others have been influenced by a prejudice against this? Testimony is in favour of the authenticity of the work, and there does not seem to be any reason for calling it in question on this occasion, but an unwillingness to admit an Irish work of so early a period. As to the degree of credit such a work is entitled to, admitting its authenticity, it seems to be such as is usually given to poetical records, in which the facts related are generally so mixed with fable, or so exaggerated, that it is very difficult to draw the line of distinction. Ware's and Ledwich's Antiquities of Ireland. Nicholson's Historical Library, &c.

CASHENDAL BAY, called also the Red bay, and sometimes confounded with Cushendon bay, which lies a little north of it; an inlet on the north-east coast of Ireland, in the county of Antrim, where a ship may stop in moderate weather, above two cables length from the shore on from three to nine fathoms water. White limestone is found near this part of the coast. N. lat. $55^{\circ} 4'$. W. long. $5^{\circ} 54'$. Hamilton's Antrim. McKenzie.

CASHEW-NUT, in *Botany*. See ANACARDIUM.

CASHGAR, anciently CASIA, in *Geography*, formerly a remarkable town of Little Bucharja, giving name to a considerable kingdom, the limits of which nearly corresponded

with those of Bucharía. This town, though fallen from its ancient splendour, still retains some commerce. See *Little Bucharía*.

Mr. Rennell has taken great pains to investigate and ascertain the position of Cashgar; and he observes, as the result of his inquiry, that Cashgar, Kóten, &c. by their known situation with regard to Samarcand, must bear to the west, rather than to the east, of north from Cashmere; and also that the ridge of mountains, (the *Imaus* of the ancient geographers,) on the west of Cashgar, Kóten, and Karia, can be no other than that which separates those countries from Little Thibet and Badakshan, and that joins on the south to Cashmere. By a mean deduced from the tables of Abulfeda, Ulug Beig, and Nafereddin, Cashgar is about $7^{\circ} 30'$ of longitude east of Samarcand; and of course 2° W. of Cashmere. The parallel of Cashgar, given in the tables, is 44° , which would place it nearly N.E. from Samarcand. That it bears considerably to the north of east from Samarcand is strongly implied by the direction of the roads, which lead to it, from Samarcand and Bokhara; that of the former being through Cogend and Andegan, (or Ferganah,) both of which lie to the north-east of Samarcand; the former at seven, and the latter at 11 days' journey from it. From Bokhara, the road to Cashgar lies through Tashkund, still more northerly than Cogend. Hence, if the direction of the road be north-east for 11 days out of 25, the distance of Cashgar from Samarcand, and 14 out of 30 from Bokhara, nearly N.E. by N., it furnishes a strong presumptive proof that the direction of the whole line is very far to the north of east. The only line of distance that will aid us in ascertaining the latitude of Cashgar is that given by Bernier, (vol. ii. lett. 9.) in which it is stated, that the distance of Cashgar from Cashmere is 44 journees, through Little Thibet; but that a shorter road lay through Great Thibet; and these journees, though not so expressed, may be understood to be those of a caravan. Such journees, says Mr. Rennell, on a distance that requires 44 days of travelling, cannot, in any country, be taken at more than 14 geographical miles of direct distance each day; and through such countries as those between Cashmere and Cashgar, perhaps at 11 or 12 only. The distance, according to this proportion, would reach to the parallel of $42^{\circ} 45'$; on a supposition that $7\frac{1}{2}$ or 8 degrees of longitude were allowed between Samarcand and Cashgar; but even if 9 or 10 were supposed, the bearing line from Cashmere is so nearly meridional, that two degrees of longitude would make a difference of a few minutes only in the latitude assigned to Cashgar. Hence it may be generally inferred, that Cashgar cannot be in a lower parallel than $42\frac{3}{4}^{\circ}$; and then, admitting either of the distances from Samarcand (between $7\frac{1}{2}$ and 10 degrees of longitude,) the bearing would be from E.N.E. to E.N.E. $\frac{1}{2}$ N. Strahlenberg places it in $42\frac{1}{2}^{\circ}$ latitude, and at $2\frac{1}{2}^{\circ}$ of longitude W. of Cashmere; M. Petis de la Croix (in Timur, b. iii. c. 7.) in 43° ; M. d'Anville went into extremes, and placed it in 40° only. Admitting then that the capital of Cashgar is situated in or about the parallel of $42\frac{3}{4}^{\circ}$, we shall find that its distance from Samarcand and Bokhara, according to the report of the Orientalists, is consistent with the difference of longitude, given in their tables. From several estimates of the rate of travelling by Sherefeddin and Atley, the difference of longitude between Samarcand and Cashgar is stated to be $7\frac{1}{2}^{\circ}$. Cashgar, according to a passage cited by capt. Kirkpatrick from Shanawaz, is bounded on the north by the mountains of Mogulistan, one extremity of which range reaches to Sháh, (i. e. Tashkund on the river Sihon, or Jaxartes,) and the other to Terfan, and from thence to the Calmuck country. On the west it is bounded by a long

ridge of mountains, from which the Mogulistan mountains branch out. To the eastward lie quicksand hills, forests, and deserts. The southern limit is not given. Hence it appears, that the northern frontier of Cashgar is on a parallel, or nearly so, with the territory of Sháh, which lies on the north of Cogend, and the capital of which is Tashkund, situate in lat. $42\frac{1}{2}^{\circ}$, according to the tables of Abulfeda, Nafereddin, and Ulug Beig. The long ridge of mountains on the west is, of course, that which extends from the north of Cashmere to a point beyond the heads of the Sihon, separating, in that part, the countries of Cashgar and Turkestan; which ridge, in Sherefeddin's Timur, is named "Karangoutac," and is reckoned, in a military point of view, inaccessible. No doubt ought to remain, says Mr. Rennell, concerning the proximity of Cashgar to Great Bucharía; when we have proved from the writings of Abul Fazil, and Abdul Humeed, that the S.W. extreme of Cashgar joins to the N.E. quarter of Cabul; or, admitting that part to be no more than a nominal dependency of Cashgar, the real territory itself is not likely to be very remote. Mr. Rennell is of opinion, that the capital of Cashgar, as well as the mountains on the north of it, which, in d'Anville's map of Asia, extend towards Acfou and Terfan, ought to be removed several degrees to the north-west, and to the neighbourhood of Al Sháh; these being the mountains of Mogulistan described by Shahnawaz. Thus a considerable change will be made in this part of our maps of Asia. Strahlenberg's map of the Russian empire is much more consonant to the ideas of Shahnawaz; and includes also the Western Tartary, and the courses of the rivers Jihon and Sihon (*Oxus* and *Jaxartes*.) His mount "Mulsart," which passes along the north of Cashgar, and Mogulistan in general, at the height of 43° and 44° of latitude, answers to the Mogulistan mountains of Shahnawaz, and really joins to Sháh on the west, having also the long ridge branching out, and forming the western boundary of Cashgar. On a general consideration of Strahlenberg's map, Mr. Rennell observes, that Cabul, Cashmere, and Cashgar, although nearly right, in respect of each other, are from four to five degrees too far east, in respect of the Caspian Sea and Samarcand; and the head of the Iriftish river is by several degrees too near to Cashgar, even as the latter stands in the map. Hence it follows, that the space between the Iriftish and Cashgar is, out of all proportion, contracted; whilst Great Bucharía is too much extended. Rennell's Memoir, p. 197, &c. See *BUCHARIA*.

CASHIER, the *cash keeper*; he who is charged with the receiving and paying the debts of a society.

In the generality of foundations, the *cashier* is called *treasurer*.

CASHIERS of the bank, are officers who sign the notes that are issued out, examine and mark them when returned for payment, &c.

CASHIN, in *Geography*, a river of the county of Kerry, Ireland, which having united the waters of the Brick, the Teal, and the Gale, falls into the mouth of the Shannon, about three leagues east of Kerry-head. It has a very narrow channel between beds of sand, and also a bar at its mouth, which can be crossed only about high water, so that it is frequented by none but sloops and small vessels. Smith's Kerry.

CASHLEH BAY, a tolerably large harbour in the county of Galway, Ireland, which has safe anchorage for vessels, that draw not above nine or ten feet water. It is however visited only by smugglers and fishermen. N. lat. $53^{\circ} 13'$. W. long. $9^{\circ} 32'$. M'Kenzie.

CASHMERE, **CASHMIRE**, or **KASHMIR**, a province of

of Asia, situate at the northern extremity of Hindoostan, northward of Lahore, and restricted to a valley of an oval form, surrounded by hills, which has its largest extent from S.E. to N.W., or more strictly, from S.E. by E. to N.W. by W. Mr. Forster reckons its dimensions 80 British miles by 40. Mr. Rennell admits that the estimate of 80 miles for the length of the flat part of the valley, does not exceed the truth by more than a very few miles; for he says, that 74 or 75 can be clearly made out. But its breadth is supposed to be 50 miles, or more; for Heerapour, at the entrance of the valley from the side of Bember, or the south side, is nearly 25 British miles across from Sirinagur; and Lar, according to Bernier, is about as far from Sirinagur as Barehmoolch is, i. e. 27 British miles; but as Sirinagur does not lie directly between Heerapour and Lar, a considerable angle takes place, and may probably reduce the 52 miles to 50 in direct distance. In the Ayin Acbaree, Cashmere is divided into two parts, viz. "Meraje" and "Kamraje," the former being the eastern part, and containing the districts situated to the E., the S.E. and the N.E. of Sirinagur; and the latter, the western part, containing the N.W. and S.W. districts. On the south-east of Sirinagur, at some distance beyond the great circle of mountains that surrounds the valley of Cashmere, is the district of Benhal. With regard to its general position, Cashmere is bounded on the west by the district of Puckholi; on the S.W. by the territory of the Glickers; on the S.E. and S. by that of Jummo and Kishtewar; and on the E. by the river Chunaub. On the N.E. lies Great Thibet, separated from it by the summit of mount Kantel; and on the N.W. is Little Thibet. Tradition reports, that the site of this valley was formerly a lake; nor is this at all improbable. It is such an effect as might be expected, in every case where the waters of a river are inclosed in any part of their course by elevated lands: and with respect to the river Behut in the present instance, it appears that the lake existed long enough to deposit a vast depth of soil before it dispersed. The Cashmerian history names the lake "Sutty-Sirr;" and adds, that Kushup led a colony of Bramins to inhabit the valley, after the waters had subsided. Cashmere, previously to the Mahometan conquest of India, was celebrated for the learning of its Bramins, and the magnificent construction of its temple. Although we are not able to ascertain the period of its subjection to the Mahometans, yet it is reasonable to suppose, that a country supplying articles of valuable commerce, and furnishing a profusion of natural beauties, would at an early date have attracted their notice, and invited their conquest. It was governed for a long series of years by a race of Tartar princes of the Jagatay or Zagathay tribe, until the year 1586, when it was subdued by Acbar, more, as it is said, by intrigue than the force of arms. After having been annexed to the house of Timur for 160 years, it was betrayed by the Mogul governor to Ahmed Shah Duranny, who formed it into a province of the Afghan empire. Cashmere is tributary to the sultan of Cabul, and at the period of Mr. Forster's residence, (A.D. 1783,) it was governed, or rather desolated, by his viceroy. See CANDAHAR.

The valley, or country of Cashmere, is celebrated throughout Upper Asia for its romantic beauties, the fertility of its soil, and the temperature of its atmosphere. Nor is its excellence in these respects to be questioned, when we consider that it is an elevated and extensive valley, surrounded by steep mountains that tower above the regions of snow; and that its soil is composed of the mud deposited by a capital river, which, as we have already said, originally formed its waters into a lake, that covered the whole valley, until it

opened itself a passage through the mountains, and left this fertilized valley an ample field to human industry, and to the accommodation of a happy race; for such the ancient inhabitants of Cashmere undoubtedly were. The author of the Ayin Acbaree dwells with rapture on the beauties of Cashmere; and on this account it was visited by Acbar and by other emperors of Hindoostan, who during the summer heats used to retire thither for the sake of enjoying a cool and refreshing climate, and who seemed to forget the anxieties of government during their residence in this "happy valley," "this garden in perpetual spring," "this paradise of India," as it was denominated by the multitude of its admirers. It appears that the periodical rains which almost deluge the rest of India, are shut out of Cashmere by the height of the mountains, so that only light showers fall there; and yet these are so abundant as to feed some thousands of cascades, which are precipitated into the valley from every part of the stupendous and romantic bulwark that encircles it. The soil is the richest that can be conceived; and its productions are those of the temperate zone. As it has generally a flat surface, copiously watered, it yields abundant crops of rice, which is the common food of the inhabitants. At the base of the surrounding hills, where the land is higher, wheat, barley, and various other grains are cultivated. A superior species of saffron is also produced in this province, and iron of an excellent quality is found in the adjacent mountains. But the wealth and fame of Cashmere have been chiefly owing to its manufacture of shawls, which are unrivalled, and which are distributed all over the western and southern parts of Asia. The delicate wool of which these shawls are made, is the produce of a species of goat, either of that country, or of the adjoining one of Thibet. It is originally of a dark grey colour, and is bleached in Cashmere by the help of a certain preparation of rice flour. The yarn of the wool is stained with such colours as may be judged the best suited for sale, and after being woven the piece is once washed. The border, which usually displays a variety of figures and colours, is attached to the shawl after fabrication; but in so nice a manner, that the junction is not visible. The texture of the shawl resembles that of the shaloon of Europe, to which it has probably communicated the name. The price of an ordinary shawl, at the loom, is eight rupees; and thence, in proportional quality, it produces from 15 to 20; and some have been sold at 40 rupees the first cost. But the value may be very much enhanced by the introduction of flowered work; and hence the weaver occasionally receives for a single shawl the sum of 100 rupees. These shawls usually consist of three sizes, two of which, the long and the small square one, are in common use in India; the other, long and very narrow, with a large mixture of black colour in it, is worn as a girdle by the northern Asiatics. A portion of the revenue of Cashmere is transmitted to the Afghan capital in shawl goods. The manufacture, however, is declined to one-fourth of the former quantity; which may be ascribed to the decline of the Persian and Hindoostanic empires. In this district are sheep, called "hundoo," which, like those of Peru, are employed in carrying burdens. A wine is made in Cashmere resembling that of Madeira; and a spirituous liquor is also distilled from the grape, in which, as well as the wine, people of all classes freely indulge. The Cashmirians fabricate the best writing paper of the East, which was formerly an article of extensive traffic; as were also its lacquer ware, cutlery, and furs; but the heavy oppressions of the government, and the rapacity of the bordering states, which prey upon the foreign traders and often plunder whole cargoes, have reduced the commerce of Cashmere to a declining and languid state. In

proof.

proof of this fact, the Cashmirians say, that during their subjection to the Mogul dominion, the province contained 40,000 shawl looms, and that at this day there are not 16,000. In Cashmere are seen merchants and commercial agents of most of the principal cities of northern India, also of Tartary, Persia, and Turkey, who at the same time advance their fortunes, and enjoy the pleasures of a fine climate and a country, over which are profusely spread the various beauties of nature. The country is plentifully watered by a number of streams and rivers, which bring their tribute to the *Behut*, (which see,) the parent of the soil; and many lakes are spread over the surface, some of which contain floating islands. The whole country indeed resembles a garden interspersed with towns and villages, varied with beautiful trees, green meadows, fields of rice, hemp, saffron, and different legumes, and intersected by canals winding through them in all forms. The scenery is in a high degree picturesque; and a portion of the romantic circle of mountains forms a part of every landscape. The pardonable superstition of the sequestered inhabitants has multiplied the places of worship of Mahadeo, of Bishen, and of Brama. Cashmere is altogether holy land; and it abounds with miraculous fountains. However, they are obnoxious to one dreadful evil, which is the frequent recurrence of earthquakes; and in order to preserve themselves from their injurious fatal effects, all their houses are built of wood, which the country supplies in great abundance. The annual public revenue of Cashmere, in the time of Aurungzebe, appears to have been only about 35,000l.; in the time of Shah Ivan the actual and realized revenues were about 25,000l.; and only 20,000l. in the time of Mahomed Shah. A revenue, says Forster, of between 20 and 30 lacs of rupees is collected from this province, of which a tribute of seven lacs is remitted to the treasury of Timur Shah. The army of Cashmere consists of about 3000 horse and foot, chiefly Afghans, who are poorly paid, and who for want of better subsistence were under a necessity of living on the kernel of the sengerah, or water-nut, which is plentifully produced in the lakes of this country. The dress of the Cashmirians consists of a large turban, a great woollen vest with wide sleeves, and a sash wrapped in many folds round the middle; under the vest, which may be properly called a wrapper, people of the higher class wear a pirahun, or shirt, and drawers; but those of the lower order have no under garment, nor do they even gird up their loins. The dress of the women is no less awkward than that of the men. Their external, and often only garment is of cotton, and shaped like a long loose shirt; over the hair, which falls in a single braid, they wear a close cap, usually of woollen cloth of a crimson colour; and to the hinder part of it is attached a triangular piece of the same stuff, which falling on the back conceals much of the hair. Around the lower edge of the cap is rolled a small turban, fastened behind with a short knot, which seems to be the only artificial ornament about them. The women of the higher class are never seen abroad. The Cashmirians are stout, well-formed, and as the natives of a country lying in the 34th degree of latitude, may be termed a fair people; and their women in southern France and Spain would be called brunettes; but their figure is coarse, their features broad, and their legs often thick. They are generally gay and lively, and much addicted to pleasure, although the Afghan government has somewhat depressed their spirit. Young and old have a taste for music. Mr. Rennell says they have a language of their own, said to be anterior to the Sanscrit; but according to Mr. Forster, it is evidently derived from the Sanerit, and resembles in sound that of the Mahrattas, though more harsh; on this account the inha-

bitants compose their songs in the Persian, or adopt those of the Persian poets. They seem to have a religion of their own, different from that of the Hindoos. Abul Fazil says "the most respectable people of this country are the Rey-shées, who, although they do not suffer themselves to be fettered by traditions, are doubtless true worshippers of God." Mr. Forster says, that he never knew a national body of men more impregnated with the principles of vice than the natives of Cashmere. Eager in pursuit of wealth, ambitious in seeking aggrandizement, arrogant and rapacious, and yet ingenious in devising and multiplying modes of luxurious expence; deceitful and treacherous; fickle in friendship and implacable in enmity:—such is the disgusting picture which Mr. Forster has exhibited of the disposition and manners of the Cashmirians. Thus, the numerous train of despicable vices engendered and nourished by slavery are here exhibited in frightful deformity; and a land, which nature formed for a terrestrial paradise, is converted by man into a region of sorrow, of penury, and of carnage. Forster's Travels, vol. i. and ii. Rennell's Memoir.

CASHMERE, CACHEMIRE, or CASHMIR, the capital of the above province, called also *Sirinagar*, is situated N. $\frac{1}{4}$ W. from Lahore, at the distance of 151 geographical miles, by the route of Bember. This city extends about three miles on each side of the river Behut, or Ihylum, which has a remarkably smooth current throughout the whole valley, the country being flat and the body of water very large; and it occupies in some parts of its breadth, which is irregular, about two miles. Over the river are four or five wooden bridges, connecting the separate parts of the city. The houses, many of which are two or three stories high, are slightly built of brick and mortar, with a large intermixture of timber. On a standing roof of wood is laid a covering of fine earth, which shelters the building from the great quantity of snow that falls in the winter season. This fence communicates an equal warmth in winter, and a refreshing coolness in summer; when the tops of the houses, which are planted with a variety of flowers, exhibit at a distance the spacious view of a beautifully chequered parterre. The streets are narrow, and choaked with the filth of the inhabitants, who are proverbially unclean. No buildings are seen in this city that are worthy of remark; though the Cashmirians boast much of a wooden mosque, called the "Jumah Mussid," erected by one of the emperors of Hindoostan; but its claim to distinction is very moderate. The lake of Cashmere, long celebrated for its beauties, and for the pleasure which it affords to the inhabitants of this country, extends from the N.E. quarter of the city, in an oval circumference of five or six miles, and joins the Ihylum by a narrow channel near the suburbs. Among the innumerable gardens which border the lake, the most conspicuous is that which was constructed by Shah Iehan, called the "Shalimar," where nature and art seem to have vied which should contribute most to its decoration. N. lat. $34^{\circ} 20' 30''$. E. long. $73^{\circ} 44'$.

CASHNA. See KASSINA.

CASHOO, a medicinal and aromatic drug which is reckoned among perfumes. All that has yet been asserted about the origin and composition of this drug, is entirely fabulous. What follows will sufficiently acquaint physicians, apothecaries, and druggists with what they ought to know of it. Cashoo is extracted from a tree which is called *catee* in the country where it grows, which is a province of Hindoostan, called Bahar, the capital of which is Patna. See BAHAR. Cashoo is properly an extract made by a decoction and maceration of the several parts of this tree, and rendered solid by evaporation. There are two sorts of simple cashoo, the

the rough, and the purified or refined; the latter is a composition of purified casboo, mixed with aromatic drugs, and made into lozenges. This casboo is made for the use of the Indians, who chew it either alone, or mixed with pinang or areca. Rough casboo is a commodity which is brought down the Ganges as far as Bengal; whence it is distributed throughout the Indies, where there is a great consumption of it; and to the Europeans, who send it into Europe. What is sent into Europe, however, is mostly purified; for casboo is not used rough any where.

Casboo is much valued in medicine: among other effects ascribed to it, is the stopping a cough, and strengthening the stomach; beside which it sweetens the breath, when, being reduced to an impalpable powder, mixed with amber-grise, and mucilages of gum adragant, it is made into pastils. Casboo must be chosen of a tanned red on the outside, of a bright red within, very shining, and not burnt. Kœmpfer observes, that they prepare at Odowara perfumed casboo, of which they make pills, small idols, flowers, and other figures, which they put into little boxes for sale. The women are very fond of it, and use a great deal of it, because it fastens the teeth, &c. The thickened juice is carried to Japan, by the Dutch and Chinese; and after it has been prepared at Macao, or at Odowara, they buy it again, and carry it to other places.

CASI, in the *Persian Policy*, one of the two judges under the nadab, who decide all religious matters, grant all divorces, and are present at all public acts; having deputies in all cities of the kingdom.

CASIA, in *Botany*, *fructu nigro*, Amm. Ruth. See *NITRARIA schoberi*.

CASIA *poetica monspeliensium*, Cam. Epit. Lob. Ic. 432. *Monspeliidisa*, Gefn. Epit. 50. *Latinorum*, Alp. Exot. 41. See *OSYRIS alba*.

CASIA, in *Ancient Geography*, a country which the ancients placed near mount Imaus in Scythia. M. D'Anville places it in the angle formed towards the west by the two chains of mountains, which he calls Imaus, one of which is to the north-east, and the other declining to the south-east. This country corresponds to the present *Cashgar*; which see.

CASIA, a promontory on the coast of Carmania, at a small distance from the mouth of the river Hydriacus.

CASIAR, or CÆSAREA, in *Geography*, a town of Asia, on the coast of the Mediterranean, in Palestine; anciently called CÆSAREA-Stratonis, which see. In the year 635, it was taken by Omar, one of the successors of Mahomet, and was alternately in the possession of the Christians and Mahometans during the religious wars, till it was finally left, with the loss of its ancient splendour, in the power of the latter.

CASII, or CASSII Montes, in *Ancient Geography*, a chain of mountains in Asia, situate in Serica, to the south of Asmiræa, and of Issedon Serica, according to Ptolemy.

CASILINUS, a river of Italy, in Campania. The town of Caslinum was seated on the opposite banks of this river, and a bridge connected its two parts. Agathias says, that this river descended from the Apennines, and discharged itself into the Tyrrhenian sea.

CASILINUM, a town of Italy, in Campania, N W. of Capua, seated on the Volturnus, at a considerable distance from the sea. It once occupied both sides of the river. During the second Punic war it distinguished itself by the resistance which its garrison made to Hannibal. Julius Cæsar established a colony in this place. Modern Capua was built on its ruins. See *CAPUA*.

CASIMERSBURG, in *Geography*, a town of Germany,

in the circle of Upper Saxony, and duchy of Pomerania; 14 miles E.N.E. of Colberg.

CASIMIR, in *Biography and History*, the name of several kings of Poland.

CASIMIR I. was the son of Mieczslaus II. and at the death of his father, in 1034, was placed under the tutelage of his mother, Rixsa, who was appointed regent of the kingdom. The Poles, aggrieved by her oppressive administration, revolted, and expelled both her and her son. Casimir took refuge in France, and, having a propensity to literature, studied in the university of Paris; and, assuming deacon's orders, he became a monk, first in Italy, and afterwards in the abbey of Cluni, in France. Poland, having suffered much during the interregnum, the nobles of the country discovered the place of Casimir's retreat, and recalled him from his exile; but it was necessary that he should be released from his clerical vows; for which purpose, a dispensation was obtained from the pope, on condition of the payment of Peter-pence by the Poles, and some other stipulations favourable to the holy see, and he was then crowned with unusual solemnity, in 1040. By marrying the sister of Jarislaus, grand duke of Russia, he secured peace from that quarter; and by the vigour of his government, he suppressed the banditti who had infested the country, and restored law, order, cultivation, and prosperity to Poland. He civilized his subjects by the establishment of churches and monasteries, and by encouraging the arts of peace he made his kingdom flourish to a degree before unknown. In 1044, he quelled the rebellion of Maslaus, who had risen from the rank of a private soldier to the highest offices of the state, and who at last assumed the title of prince of Mazovia. He also expelled the Bohemians from Silesia, and established an episcopal see at Breslaw. After an honourable and happy reign of 18 years, he died, in 1058, much regretted, and left the crown to his son Boleslaus.

CASIMIR II. surnamed *the Just*, was the youngest son of Boleslaus III. who, at the death of his father, in 1123, was left an infant in the cradle, without any provision. In mature age, he was advanced to the dignity of prince of Sandomir; and, as an evidence of the propriety with which the appellation of *Just* was bestowed upon him, the following anecdote is recorded. Having won at play all the money of one of his nobility, the loser, incensed at his ill fortune, struck the prince a blow on the ear. The offender instantly fled; but being pursued and taken, he was condemned to lose his head. Casimir interposed. "I am not surprised," said the prince, "that, not having it in his power to revenge himself on Fortune, he should attack her favourite." He revoked the sentence, returned the nobleman his money, and declared that he alone was faulty, as he had encouraged, by his example, a pernicious practice, that might terminate in the ruin of his people. The Poles, dissatisfied with the conduct of his brother Mieczslaus III., deposed him, and elevated Casimir to the throne, in 1177. The new sovereign proved himself worthy of the honour, by subduing the Lower Poland and Pomerania, abolishing all exorbitant imposts, reforming the abuses of his predecessor's administration, and restoring rights and privileges that had been alienated from their possessors. The brother of Casimir, deprived of his crown, and reduced to a state of extreme indigence, supplicated compassion; and so far succeeded, that the reigning prince determined to evacuate the throne in his favour, and pledged himself for his future good conduct; but the states, to whom Casimir applied for permission to resign, peremptorily refused it. He connived, however, at the irregularities of his brother, and particularly at his taking forcible possession of Gnesna, and Lower Poland, where he might have lived in splendour and

and in peace. But his restless spirit led him to extend his encroachments, and he persisted in his endeavours to wrest the crown from his brother. It became necessary, at length, to restrain his usurpations; and to compel him to evacuate all his conquests. The last enterprize of this prince was a kind of pious crusade against the relapsed heathens of Prussia, whom he subdued rather by the reputation of his wisdom and generosity than by force of arms. Soon after his return to Cracow from this expedition, he died, in 1194, after a reign of 17 years, lamented as the most amiable prince that had ever filled the throne of Poland. With his distinguished virtues, however, he blended culpable foibles. In his palace he was the slave of his mistresses.

CASIMIR III. surnamed *the Great*, succeeded his father Uladislaus III. in 1333, and soon after his accession engaged in a contest with the Teutonic knights, who obtained the support of the kings of Bohemia and Hungary. His subjects wished him to vindicate his claims and to punish the usurpation, perfidy, and turbulence of these knights, by declaring war against them; but Casimir, sensible of their power, thought it most prudent to wait for a more seasonable opportunity, and acquiesced in the restitution of Culm and Cujavia. At this time he had another more important object in view than that of regaining Pomerania, which had been adjudged by the royal umpires to the knights; and this was the conquest of the province called Black Russia, which, together with Volhinia and Mazovia, he completely subdued and annexed to his Polish dominions. Having accomplished this object, he directed his attention to the civilization and improvement of his country. Accordingly, he first gave the Poles a regular code of written laws, such as had never before been seen in Poland, which he caused to be observed by all ranks of people, and he thus introduced justice and order in the room of arbitrary decision and undefined extortion. This written code he presented to a general diet, where it was examined, approved, and enlarged. He also strengthened the frontiers of the country by fortresses, inclosed the chief cities of his dominions with walls, built churches, founded monasteries, and pursued every measure that was likely to conciliate the affection and attachment of his subjects, and to increase the wealth and prosperity of the kingdom. His incontinence cast a cloud over his other virtues; and he incurred peculiar reproach by shutting up one of his wives in a monastery that he might not interrupt his licentious intercourse with a favourite concubine. His works of piety and charity recommended him to the favourable judgment of the clergy; and they not only extenuated the criminal indulgence of his ruling passion, but lavished upon him the highest encomiums. He was thrice married, but left no children; he was the last Polish king of the direct line of the Piasts. His death, which happened in 1370, at the age of 60 years, and after a reign of 37, was occasioned by a fall from his horse in hunting.

CASIMIR IV. the second son of Jagello, was grand duke of Lithuania, when, in 1445, his brother Uladislaus was killed in the battle of Varna against the Turks, and was crowned as king of Poland, in 1447.

The first operations of his reign were directed against Bogdan, who usurped the vassalship of Moldavia, whom he obliged to sue for peace. He afterwards undertook the protection of the Prussians against the tyranny of the Teutonic knights, whom he expelled from many of their cities. But whilst his army covered the siege of Marienburg, the knights attacked his camp with great impetuosity, and constrained him to secure himself by an ignominious flight, after 4,000 of his troops had been slain or taken prisoners. In

consequence of this defeat, he returned to Poland, and, having recruited his forces, he resumed the siege of Marienburg and took it; and thus humbled the knights to such a degree, that, by a treaty of peace concluded at Thorn, they ceded the territories of Culm, Michlow, and the whole duchy of Pomerania, together with the towns of Elbing, Marienburg, Talknith, Schut, and Christburg, to the crown of Poland. The king, in return, restored to them all his other conquests in Prussia; granted a seat in the Polish senate to the grand-master; and indulged him with other privileges, on condition that six months after his accession, he should do homage for Prussia, and take an oath of fidelity to the king and republic. Such were the conditions on which Casimir terminated the war, and humbled an order which had given perpetual disturbance to the northern hemisphere, for nearly the space of two centuries. Moldavia was also made tributary to Poland; and when the crown of Bohemia became vacant, the barons bestowed it upon Uladislaus, the eldest son of Casimir, in opposition to the intrigues of Matthias Corvinus, the king of Hungary, whom Uladislaus pursued into his own country, and defeated. Thus the three crowns of Poland, Hungary, and Bohemia, were united in the same family, and Casimir's power was greatly augmented, though the felicity of his people, oppressed with grievous taxes, and diminished in number by a variety of bloody engagements, did by no means increase in the same proportion. Casimir wished to retrieve his domestic affairs by the arts of peace; but before he could accomplish his purpose, he died, at the age of 64, in the year 1492, more admired than beloved or regretted. In this reign the deputies of the provinces first appeared at the diet, and assumed to themselves the legislative power; all laws before this period having been framed by the king, in conjunction with the senate. Casimir is also said to have published an edict, enjoining the study of the Latin tongue, in which both he and his subjects were before grossly ignorant, and thus he rendered this language ever since almost vernacular among the gentry of Poland.

CASIMIR, JOHN, second son of Sigismund III. king of Poland, was originally destined for the church, and entered the society of the Jesuits, after having visited most of the courts of Europe. From pope Innocent X. he had obtained a cardinal's hat: but upon the death of his brother Uladislaus VII. in 1648, the Poles elected him to the crown. Upon his accession he expressed his disapprobation of the measures which had irritated the Cossacks and excited them to rebel; and, after some actions with them, he concluded a treaty of peace which was much in their favour. Afterwards the war was renewed; the Cossacks were defeated, and again obtained a peace, which occasioned dissatisfaction to the nobility. In 1653, the Russians availed themselves of the hostile disposition of the Cossacks, and of the divisions that subsisted between Casimir and the Polish nobility, to commence hostilities against Poland; and, uniting with the Cossacks and Tartars, entered Lithuania, ravaged the country, and treated the inhabitants with great barbarity. At the same time Charles Gustavus, king of Sweden, invaded Poland by the way of Pomerania, and, reducing the whole country as he advanced, with Cracow its capital, obliged the unfortunate Casimir to seek an asylum in Silesia. Casimir's flight being interpreted by the Poles as an abdication of the crown, they took an oath of allegiance to the conqueror; and Gustavus became master of all Poland and Prussia, the city of Dantzic excepted. The impositions of the Swedes, aided by the exhortations and example of the clergy, roused again a spirit of resistance. Casimir was privately invited to return to his dominions; and he immediately put himself at the

the head of a considerable army, assembled by the nobility. The Tartars formed an alliance with the Poles, and, attacking a body of Swedes, totally defeated them. The Lithuanians also revolted from the Swedish monarch, and taking advantage of the dispersed condition of his soldiers, attacked and massacred them before they could unite and form themselves into a body for their own defence. Gustavus, however, prosecuted the war, and took Warsaw by storm; but at length he was obliged, in 1657, to withdraw his army from the Polish territories, and to employ it in the defence of his own country, which was attacked by the Danes. Soon afterwards the Swedes were under a necessity of wholly evacuating Poland. After the death of Gustavus, Casimir made a peace at Oliva, in 1660, with Charles XI. his successor, upon condition that he should renounce all claim to the Swedish crown, and that the Swedes should restore all their conquests in Poland, Prussia, and Livonia, Riga and a few other places excepted. Peace being thus established between the Poles and the Swedes, Casimir determined to commence a war with the Russians, who had made divers incursions into his dominions; and having succeeded in two decisive engagements, he laid siege to Wilna, the capital of Lithuania, which had been taken by the enemy during the late war with Sweden. The siege was protracted till dissensions occurred between the king and some of the nobility, who insisted that he should dismiss his German mercenaries, under a plea that they were introduced to destroy the liberties of the republic, and not to recover her territories. The animosity produced an open variance; forces were raised on both sides; a battle ensued; the royal party was defeated; and the contest terminated with the dismissal of the German levies. Upon this compliance on the part of Casimir, the discontented party threw off the mask, lost all respect for the person of the king, and occasioned to him so much vexation, aggravated at the same time by the loss of his wife, who had been his brother's widow, that he resigned the crown in disgust, A. D. 1668, and retired to France, where he was honourably received and hospitably treated by Lewis XIV. He died at Nevers, in December, 1672, and a magnificent monument was erected for him at the church of the abbey of St. Germain des Prez, of which he was abbot. The turbulent reign of John Casimir gave rise to the privilege assumed by each single nuncio at the diet, of putting a stop to any public affair by his negative, called the "liberum veto;" a fruitful source of anarchy and violence. *Mod. Un. Hist.* vol. xxx. Moreri.

CASIMIR, MATTHIAS SARBIEVSKI, a Polish Jesuit, and an excellent Latin poet, was born in 1597; and, in the judgment of M. Baillet, he is an exception to a general maxim of Aristotle and others among the ancients, which teaches us to expect nothing ingenious and delicate from the northern climates. His odes, epodes, and epigrams, have been thought not inferior to some productions of the finest wits of Greece and Rome. Grotius, D. Heinsius, and others, have not scrupled to affirm, that he is not only equal, but sometimes superior, even to Horace himself. Such was the respect which he entertained for Virgil, that he had begun to imitate him in an epic poem, called the "Lesciade," which he had divided into 12 books. But his death, which happened at Warsaw in 1640, put a stop to his progress in this work. His epigrams, however, are allowed to be much inferior to his odes. We have a translation of one or two of his small pieces in Dr. Watts's lyric poems. There have been many editions of his poems, the best of which is that of Paris in 1759.

CASIMIR, in *Geography*, a town of Poland, on the Vistula, on the side opposite to that of Cracow, from which

it is only separated by a bridge, built by king Casimir the Great, for an university, which contains 11 colleges and 14 schools.

CASINATES, in *Ancient Geography*, the inhabitants of the town of Casinum, which see.

CASING, among *Hunters*, denotes the stripping off the skin of a hare, fox, or badger. They say, *flay* a deer, *case* a hare, and all sorts of vermin. This is done by beginning at the snout or nose of the beast, and so turning his skin over his ears down to the body, and the very tail.

CASING of *Timber-work*, is the plastering of a wooden house all over on the outside with mortar, and striking it, yet wet, by a ruler, with the corner of a trowel, or the like instrument, to make it resemble the joints of free-stone; by which means, the whole house appears as if built thereof. It is best done on heart-laths, because the mortar is apt to decay the sap-laths in a short time. It is commonly laid on at two thicknesses, the second before the first is dry.

CASINGS, a provincial term applied to dried cow's dung, which is used in several parts for fuel.

CASINO, in *Geography*, a river of Italy, which runs into the sea, 2 miles N.W. of cape Stilo.

CASINUM, in *Ancient Geography*, a considerable town of Italy, in Latium, upon the Latin way from Campania. Hannibal encamped two days under its walls. After the wars of the Samnites, under the consulate of M. Valerius and Publius Decius, the Romans, having made themselves masters of Casinum, sent a colony thither in the year of Rome 442. Its ruins are visible near San. Germano.

CASINUS, a river of Italy, which, according to Strabo, joined the Liris at the place where was situated the town of "Interamna." It is supposed to have been the present *Sacco*.

CASIORUM INSULÆ, small islands situate near the small island of Casus, to the south of the island of Carpathus.

CASIROTÆ, a people of Asia, who inhabited the territory N. of Aria, on the side of Drangiana, according to Ptolemy.

CASIUS, the name of two mountains of Phœnicia, one to the south, on the frontiers of Egypt, the other to the north, near "Seleucia Pieriæ," to the right of the mouth of the Orontes. The term "Casius," in the Eastern language, denotes limit or boundary, and the situation of these mountains, in their relation to Phœnicia, justifies this etymology. The mount Casius of Syria (see Pliny, N. H. l. v. c. 22.) was situated to the south of the mouth of the Orontes, near Seleucia to the south-west. The present mount Casius rises above Antioch to a prodigious height; but Pliny surpasses hyperbole when he says that from its summit we may discover at once both the morning's dawn and the evening twilight. The mount Casius that lay on the frontiers of Syria and Egypt is situated on the northern coast of the isthmus of Suez, and was distant, according to Strabo, 300 stadia from Pelusium. According to this geographer (l. xvi. vol. ii. p. 1102.) it resembled heaps of sand, and projected into the sea. On this mountain the body of Pompey the Great was deposited, and it had a temple of Jupiter, named *Casius*. Jupiter has also a temple, under this appellation, on mount Casius in Syria, near Seleucia, as is evident from the resort of the inhabitants thither every year to celebrate a feast in honour of Triptolemus. He was also worshipped under this title at Cassiope, a city in the island of Corcyra, situate on the westernmost cape of the island, and nearest the main land. Suetonius represents Nero as landing

on this point, and singing before the altar of Jupiter Casius. There are medals still extant, which exhibit Jupiter with these inscriptions, "ZEYC KACIOC," and "ΖΕΥΣ ΚΑΣΙΟΣ," expressive of this title.

CASIUS, a river of Asia in Albania, mentioned by Pliny and Ptolemy; and the mouth of which is placed by the latter between those of Gherius and Albanus.

CASK, in French *Casque*, a head-piece or helmet, a defensive armour for covering the head and neck. Formerly all the gens d'armes of France wore *casques*. The king had one gilt with gold, the dukes and counts had theirs with silver, gentlemen of extraction wore them of polished steel, and the rest of plain iron. The word is commonly supposed to come from *casus*, the Latin term for a helmet.

The Romans had their casques of brass or iron, which were proof against the strokes of any sword or sabre, and were ornamented to the height of two feet with plumes of feathers, or tufts of horse hair, of different colours, which made them look grander and taller, and struck more terror into their enemies. The chiefs and principal officers wore casques gilded and enriched with precious stones, with the tops of them ornamented with plumes and aigrettes of value, which served to distinguish them from others. The Scandinavians, and other people of the north, used to wear them, and the invention of them is ascribed by some to the Scythians and the Celts. It is supposed, however, to have been one of the most ancient of all coverings for the head, and it is frequently seen on ancient medals in a variety of forms or fashions, as the Grecian, the Roman, &c. Kings and emperors wore it; and even the gods themselves are figured as wearing it. That which covers the head of Rome, has generally two wings, like those of Mercury. Those of some kings are furnished with horns, like those of Jupiter Ammon; whilst those of some others have only bulls' or rams' horns, to denote their uncommon strength.

CASK, in *Heraldry*, the same with helmet.

CASK is also used as a common name for vessels of divers kinds; in contradistinction from the liquor, or other matter contained therein. Thus a hoghead of spirits, &c. is said to weigh 4 Cwt. $\frac{1}{2}$ and 22lb. cask and liquor; a puncheon, 6 Cwt. $\frac{1}{4}$ and 21lb. cask and liquor. See TUN, &c.

CASK of Sugar, is a barrel of that commodity, containing from eight to eleven hundred weight.—A cask of almonds is about three hundred weight. No one shall transport any wine cask, &c. except for victualling ships, under a certain penalty, by 35 Eliz.

For the method of estimating the solidity or content of a cask, see FRUSTUM of a Pyramid, and GAUGING.

CASKET, in a general sense, a little coffer, or cabinet. See CABINET.

CASKETS, in *Geography*, two high rocks at W. by N. and W.N.W. from the W. end of Alderney, besides many smaller ones, several of which are covered by the flood-tide. On the westernmost of the Caskets there are three light-houses, disposed in a triangular form. N. lat. 49° 45' 30". W. long. 2° 24' 40". High water at spring-tides at 9 o'clock. See ALDERNEY.

CASKETS, in *Sea-Language*, are small ropes made of sinnet, and fastened to gromets, or little rings upon the yards; their use is to make fast the sail to the yard when it is to be furled.

CASKETS, *breast*, are the longest and highest of these, or those in the midst of the yard, betwixt the ties.

CASLEU, in the *Hebrew Chronology*. See CISLEU.

CASLON, WILLIAM, in *Biography*, an eminent letter-founder, was born at Hales Owen in Shropshire, in 1692;

and having served an apprenticeship to an engraver of ornaments on gun-barrels, he embarked for himself in this business in London, connecting with it the manufacture of tools for the book-binders, and for the chasing of silver plate. Whilst he was thus engaged, he became acquainted with the elder Mr. Bowyer, who introduced him to a foundry; and being satisfied of his abilities for undertaking the business of cutting types, though he had never before seen it performed, he concurred with two other eminent printers (Mr. Bettenham and Mr. Watts) in advancing the sum of 500l. towards enabling him to commence the undertaking. Accordingly he immediately applied to it with singular assiduity and success. In 1720, the society for promoting Christian knowledge proposing to print, for the use of the Eastern churches, in Palestine, Syria, Mesopotamia, Arabia, and Egypt, where printing was not allowed, the New Testament and Psalter in the Arabic language, engaged Mr. Caslon to cut the fount of letter; in his specimens of which he distinguished it by the name of "English Arabic." Having finished this fount, he cut the letters of his own name in "Pica Roman," and placed them at the bottom of one of the Arabic specimens. When Mr. Palmer, the reputed author of the "History of Printing" (which was in fact written by Psalmanazar), saw the name, he advised the artist to cut the whole fount of Pica; in the execution of which he surpassed the other founders of the time. Mr. Palmer afterwards repented of the advice he had given him, and dreading the competition of such a formidable rival, endeavoured to discourage his farther progress. Mr. Caslon, disgusted by this treatment, applied to Mr. Bowyer, and under his inspection he cut, in 1722, the beautiful fount of "English" which was used in 1726, in printing Selden's works, and the Coptic types that were made use of for Dr. Wilkins's edition of the Pentateuch. Under the farther encouragement of his three first patrons, he proceeded with vigour in his employment, acknowledging his particular obligation to Mr. Watts as his master, from whom he had learned his art. Such was the perfection to which he attained, that it was no longer necessary to import types from Holland; and his own were so beautiful and elegant, and so far exceeded the productions of the best artificers, that they were frequently exported to the continent. A more beautiful specimen than his, it has been justly said, is not to be found in any part of the world. After some previous changes of habitation, he at length, viz. in 1735, established his foundry in Chiswell-street, where in process of time it became the most capital of any existing in this or in any foreign countries. Having acquired opulence in the course of his employment, he was introduced into the commission of the peace for the county of Middlesex; and towards the close of his life, devolving the active part of his business on his eldest son, he retired to Bethnal green in the vicinity of London, where he died in January 1766 at the age of 74 years. Mr. Caslon was universally esteemed as a first-rate artist, a tender master, and an honest, friendly, and benevolent man; and sir John Hawkins (*Hist. of Music*, vol. v.) has particularly celebrated his hospitality, social qualities, and his love of music. *Biog. Brit.*

CASLUHIM, in *Scripture Geography*, one of the nations descended from Mizraim, who are supposed to have settled somewhere towards the entrance of Egypt, about mount Casius, in that part of the Lower Egypt called Casiotis by Ptolemy and others, which places, it is thought, retain some likeness of the name; but, without relying on that argument, they appear to have been planted near the Capthorim, because the Philistines seem to have been descended from both these people, and consequently to have been settled in Egypt. Bochart, misled by following the Jewish notion about Capthor, fancied

fancies them to be the inhabitants of Colchis, at present called Mingrelia.

CASMA, in *Ancient Geography*, a town mentioned by Ptolemy, and placed in the eastern part of Mauritania Cæfariensis between Aquæ Calidæ and Bida.

CASMA LA BARCA, in *Geography*, a town of South America, in the country of Peru, and jurisdiction of Santa. *Casma*, or *Cazma* port is 4 leagues N. from Morgon, and 11 S.E. from Ferrol, on the coast of Peru, in the South Pacific Ocean. S. lat. about $9^{\circ} 40'$. This is a good harbour, though subject to hard gales.

CASMINA, a town of Sicily, placed by some near the source of the Hippatis, and by others between Acræ and Camarina. This city, according to Thucydides (l. vi. c. 25.) was built by the Syracusans 90 years after Syracuse, or about the year 668 B.C.

CASMONATES, a people of Italy, who inhabited the mountains of Liguria. Pliny.

CASOAR, in *Ornithology*, the French name of the cassowary (Buff.) See STRUTHIO CASUARIUS.

CASOLI, in *Geography*, a town of Naples, in the province of Abruzzo Citra; 15 miles S.S.E. of Civita di Chieti.

CASOS, or CASUS, CASSO, an island of the Mediterranean, one of the Cyclades, is said to have received its name from Caso, the father of Cleomachus. This little island sent a colony to mount Casius, dependent on Syria. According to Strabo, it is distant from Carpathus, now called Scarpanto, 70 stadia or $2\frac{1}{2}$ leagues, and 250 stadia, or 9 leagues, from Samonium, a promontory of Crete. It is 80 stadia, or 3 leagues, in circumference; on it was formerly a town of the same name, which no longer exists, and round it are several smaller islands. The population of this island at the present time is not considerable; and entirely composed of Greeks, though subject to the Turks. It is little frequented by shipping, its road being difficult of entrance, and its shore dangerous of access. The inhabitants, however, are on that account more happy and more free; as the Turks seldom venture to go thither to exercise the despotism with which they oppress the countries subject to their dominion. The Greeks of Casso, being more independent and more secure in their property, are more laborious than others; their toil and industry have introduced fertility on a soil of which the stratum even of vegetable earth, which covers the rocks, appeared not to render it susceptible; the vines which grow on this stony ground, furnish them with very good wine; and the honey, which they gather, is still, as in ancient times, abundant, and of an excellent quality. The Cassiots, like all the inhabitants of the small islands which cannot supply the wants of their population, are navigators and traders; but their industry in that way does not extend beyond the limits of the Archipelago. The women of the island wear a jacket, sash, and long robe, of cotton; the only difference consisting in the embroidery, which varies according to their different tastes, and in the manner of wearing their hair, which some suffer to flow upon their shoulders, in one or more tresses, and others fasten to the crown of the head, letting it fall down again upon the neck. Their employment is that of spinning cotton and embroidering, and making the fine linens which they wear. Several of them are handsome, and their amusements are dancing and music. The men, during the spring, summer, and part of autumn, are out at sea, so that the island seems to have few males. These trade to different islands of the Archipelago, and return from time to time with provisions for their families, and only pass the winter with them. They sow the land with barley and wheat at the commencement of the rainy season, which lasts from October to February;

collect the harvest in March, and then return to sea, supplying from other countries the deficiency of the produce of their own island. The cultivated part of the island is divided into compartments, and shared among the Cassiots. The rain is not continual in the above-mentioned months, but none falls in any other; during the remainder of the year the air is pure and serene, and both days and nights fine and clear. The heats are moderated by the sea-breezes, and beneath a beautiful sky, the inhabitants enjoy a delightful temperature, and are almost strangers to every kind of disease. The men enjoy their repasts, consisting of poultry, eggs and rice, and good wine, dining together seated in a circle on the carpet, and the women in a separate apartment. Savary expresses his admiration of the regularity and wisdom of this little republic, the peace and harmony that prevailed among its members, and, above all, that cheerfulness and content which was so visible in their countenances. "In the midst of slaves crouching beneath the Ottoman yoke, I have found," says this writer, "a rock only 3 leagues in circumference, on which the Turk dares not set his foot, and inhabited by a free and happy people. There each father of a family is a sovereign within his own house; he decides every difference, and his decrees are laws, which cannot but be equitable, since they are only dictated by paternal tenderness. When any disputes arise, the priest and the old men assemble, and decide them; but disputes cannot be frequent among citizens, who are all equal and alike unacquainted with poverty or riches. All the members of this little society are employed; and I have seen the handsomest of their women go down into the valley, to wash their linen at the fountain, as in the days of Homer. They cheer their labours with a song; nor do they imagine themselves disgraced by their humble employment." Several islets or shoals lie near the northern coast of the island of Casso, called by the ancients the Cassian islands; they are barren, and scarcely covered with a few bushes; but they shelter the road of Casso from the winds and the sea to the north.

CASPARGUS, in *Ichthyology*, a name given by Salvian, from *Asian*, to a fish supposed to be of the Sparus genus, and probably the *Sparus annularis* of modern naturalists; it is described as being of a plain yellowish colour, with a large annular (ocellated) spot near the tail, which perfectly agrees with *Sparus annularis*.

CASPASIUS, or CASPASIUM *flumen*, in *Ancient Geography*, a river placed by Pliny in Asiatic Scythia.

CASPATYRUS, or CASAPYRUS, a town of Asia, placed by Herodotus (l. iii. c. 52.) in Pactya, upon the Indus; but by Hecataeus, cited by Steph. Byz. in Ganderia, in the vicinity of the Sogdians and Bactrians, and south of these people. The modern name of this town, according to M. d'Anville, is Tchuparch.

CASPE, in *Geography*, a town of Spain, in Arragon, situate at the conflux of the Guadaloupe and the Ebro. The adjacent country produces corn, wine, oil, and saffron. Here Ferdinand IV. was elected king of Arragon; 44 miles S.E. of Saragossa, and 35 S. of Balbastro.

CASPEAN, or BEAUTIFUL, a small lake of North America, in Greensborough, Vermont. On its western side is Hazen blockhouse. It is a head-water of La Moille river.

CASPERIA, in *Ancient Geography*, a town of the Sabines, mentioned by Virgil; towards the south-east of Reate. It is called *Casparula* by Silius Italicus, l. viii. v. 416.—Also, a country of India, on this side of the Ganges, below the sources of the Bidaspæ, Rhoas, and Sandubal, according to Ptolemy.

CASPHIN, or CASPHIS, a small but well fortified town

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of Palestine, in the tribe of Dan, seated on a small lake about 6 miles E. of Jamnia. It was fenced with high walls, and so well provided within, at the time of the Maccabith wars, that the inhabitants, trusting to their own strength, threw out many scornful sarcasms on the Jewish army; but Judas Maccabæus assaulted it with such unexpected bravery, that he made himself master of it, and put all the inhabitants to the sword, inasmuch that a neighbouring lake, about 2 furlongs broad, was seen running with blood. 2 Maccab. xii. 12—16.

CASPIÆ PYLÆ, or PORTÆ, an important defile between the mountains and the Caspian sea. See CASPIAN Gates.

CASPIAN SEA, in *Geography*, a detached sea of Asia, which has no visible connection with any of the great oceans, nor apparent outlet, and which, on this account, some writers have classed among the larger lakes, not thinking that it properly deserves the appellation of a sea. It is bounded on the north by the province of Astrachan and the Caucasus, and on the south, east, and west, by different provinces of Persia. The governments of Ufimsk and Caucasus border on the Caspian. It was anciently called by the Greeks the Hyrcanian, i. e. the Persian, Sea; by the Tartars it is denominated Akdinghis, or the White Sea; by the Georgians it is termed the Kurtshenfskian Sea; and the Persians denominate it Gursen, from the old Persian capital, Gurgan, which is said to have stood in the province of Astrabad, only seven versts from the sea. It reaches in length about 10 degrees, from about the 37th to the 47th degree of north latitude, or about 630 miles from Grief to Medshetifar, and in breadth from 100 to 260 miles, where it is the widest. Its superficial contents amount to above 36,000 square English miles.

The ancient geographers were very imperfectly acquainted with this sea, and have given very unfounded and absurd descriptions of it. According to Strabo, (lib. xi. p. 773.) the Caspian is a bay, that communicates with the Great Northern Ocean, from which it issues at first by a narrow strait, and then expands into a sea, extending in breadth 500 stadia. With him Pomponius Mela (lib. iii. c. 5.) agrees, and describes the strait by which the Caspian is connected with the ocean as considerable in length, and in breadth so narrow, that it had the appearance of a river. Pliny (N. H. l. vi. c. 13.) gives a similar description of it. In the age of Justinian, this opinion concerning the communication of the Caspian Sea with the ocean was still prevalent. Some early writers, by a mistake still more singular, have supposed the Caspian Sea to be connected with the Euxine. Quintus Curtius (l. vii. c. 7.) has adopted this error. Arrian, (l. v. c. 26.) though a more judicious writer, and who by residing for some time in the province of Cappadocia, as governor, might have obtained more accurate information, declares in one place, that the origin of the Caspian Sea was still unknown, and expresses a doubt whether it was connected with the Euxine, or with the Great Eastern Ocean which surrounds India. These errors appear more extraordinary, as Herodotus, near 500 years before the age of Strabo, had given a just description of this sea. "The Caspian," he says (lib. i. c. 203.) "is a sea by itself, unconnected with any other. Its length is as much as a vessel can sail with oars in 15 days, and its greatest breadth as much as it can sail in eight days." Aristotle (Meteorol. l. ii.) describes it in the same manner, and with his usual precision contends, that it ought to be called a great lake, not a sea. Diodorus Siculus (vol. ii. l. xviii. p. 261.) concurs with them in opinion. Ptolemy, however, maintained its communication with the Euxine, affirming that the waters of both had a subterraneous connection; as, otherwise, it was not to be explained how so many large

rivers should flow into the Caspian; for, which there was not one channel out of it. What, it might be said, becomes of the waters of the Volga, the Yaik, the Yemba, the Kur or Cyrus, the Araxes, the Bystrai, the Akfa, the Koisa, the Terek, and the numberless others that flow into it? By the sun alone they cannot be evaporated; there is no visible outlet for them; and yet the sea is never perceptibly swollen, except merely in the Spring on the melting of the snows. See this subject discussed by captain Perry in his state of Russia, p. 100, &c. printed at London in 1716. Those who have recourse to subterraneous passages, by which its water must flow into the Persian sea, or more probably into the Euxine, allege two arguments in support of their opinion. In the first place they say, that the Caspian rises very high with a westerly wind; whereas the Euxine, on the contrary, rages most when the wind is at east: consequently, the east wind favours the exit of the waters of the Caspian, and the west wind impedes it. But this is one of those fallacies, denominated by logicians, "Causa pro non causa;" all the winds that bring humid vapours with them are more stormy than those which proceed from arid regions. But the west wind comes hither from the Euxine and the Palus Mæotis; and consequently the Caspian must necessarily be put into more vehement agitation by it. Secondly, it is pretended, that this sea has a whirlpool, which, with a horrid noise, swallows up all the superfluous water, and discharges it into the Euxine. In proof of this, it is farther urged, that a species of sea-weed, growing only on the shores of the Caspian, is found at the mouth of this tremendous vortex. To which they add, that near to this vortex is a sort of fish, which is only caught in the Euxine; and lastly, that in former days, a fish was taken in the Caspian sea, with a golden ring about its tail, on which was this inscription; "Mithridates mihi dabat in urbe Sinope libertatem et hoc donum." See Kircher's *Mundus Subterraneus*, lib. ii. c. 13. But later accounts are silent with regard to a whirlpool; the fishes said to be found only there and in the Euxine are yet to be more accurately described; and the story from Kircher has very much the air of a fiction. Sea-weed grows every where on the shores of this sea, from Astrachan to Sulak, and thence again to the Muganian Steppe. Upon the whole, therefore, we may conclude, that the escape of the waters of the Caspian into the Euxine is an ungrounded hypothesis. Seleucus Nicator, indeed, the first and most sagacious of the Syrian kings, at the time when he was assassinated, entertained thoughts of forming a junction between the Caspian and Euxine seas by a canal, and of thus extending the trade of his subjects in Europe and supplying all the countries in the north of Asia, on the coast of the Euxine Sea, as well as many of those which stretch eastward from the Caspian, with the productions of India; but his scheme failed. See CANAL. None of the ancient authors above cited have determined whether the greatest length of the Caspian was from north to south, or from east to west. In the ancient maps that illustrate the geography of Ptolemy, it is delineated, as if its greatest length extended from east to west. In modern times, the first information concerning the true form of the Caspian, which the people of Europe received, was given by Anthony Jenkinson, an English merchant, who with a caravan from Russia travelled along a considerable part of its coast in the year 1588. The accuracy of Jenkinson's description was confirmed by an actual survey of that sea made by order of Peter the Great, A.D. 1718; when it was found to be in length about 1100 versts from the mouth of the Ural to the coast of the Mosanderan; its greatest width from the mouth of the Terek to the extremity of the bay of Mertvõi Kulyuk

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Kultyuk being 8°, rather more than 700 versts. At its southern extremity, from the point of Lenkeron to the peninsula, situate at the mouth of the bay of Balkan, it is 6°, somewhat more than 525 versts, and at its greatest width 2° 35', or 225 versts. Its circumference, comprehending the great gulfs, but excluding the little sinuities, is 4180 versts.

The Caspian is supposed at a former period to have extended further to the north, where the deserts are still sandy and saline, and present the same shells that are found in the Caspian; but the chain of mountains which branches from the west of the Ural to the north of Orenburg, and reaches to the Volga, must, in all ages, have restricted the northern bounds of the Caspian. In the east this sea is generally supposed to have extended at no very remote period to the lake of Aral; the deserts on that side presenting the same features as those to the north, though now an elevated level lies between the sea of Aral and the Caspian, occasioned perhaps by the quantity of sand rolled down by the Gihon, the Sirr, and other rivers which now flow into the sea of Aral. The coasts of the Caspian northward, from the Terek towards the west, as far as the eastern extremity of the bay of Mertvoi Kultyuk, are low, flat, swampy, and overgrown with reeds; the water too is shallow. On the other shores from the Terek to the desert of Korgan near Astrabad, and from the northern part of the bay of Balkan to that of Mertvoi Kultyuk, the country is mountainous, the shores bold, and the water very deep. The ground in many places, not far from the shore, is so deep that a line of 450 fathoms will not reach it. This sea is the receptacle of many large rivers, as the Emba, or Yemba, the Ural or Yaik, and the Volga from the north; the Kuma, Terek, Kur, and Kizil Ozen from the west; those from the south are inconsiderable: but from the east it is supposed still to receive the Tedjen; and of the rivers that were formerly supposed to disembogue into it, several do not exist, such are the Jaxartes and the Oxus (Gihon), which were pretended to flow hither from the east; the latter, in particular, is said to have flowed into it by one or two branches, till it bent northward and joined the sea of Aral. Some writers have reported, as a striking peculiarity of the Caspian, that during 30 or 35 years, its waters are constantly increasing, and then for the same term continually decrease; but this report is not confirmed by any stated observations. This sea has no regular flux or reflux; and, on account of shoals, it is navigable only by vessels drawing from 9 to 10 feet of water: it has strong currents, and, like all inland seas, is subject to violent and dangerous storms, which the Russian vessels, badly constructed, weather with difficulty. The water is in general salt, though not in all places, particularly in those where the large rivers empty themselves into it.

The Caspian has been observed to remain equally full; the true reason of which is perhaps to be sought in the quality of its bottom; which consists, not of a thick slime, but of a shell-sand, the particles of which, touching only in few points, render it very porous. Of the same substance the whole shore is likewise formed. Layer upon layer it lies three fathoms deep. This indeed lets the fresh water through, but it becomes immediately salt again by means of the salt water that presses upon it. Through this sand the water is filtered, and falls into the abyss beneath in the same quantity which flows into the sea. In the bay of Emba, above the river Yaik, the reverse is seen. The water there is not let through; it therefore stagnates, and even the fishes putrefy. Its exhalations are extremely noxious. The wind that blows over this bay has been known to come on with such surprising force as to throw down the

sentinels of the Russian forts, erected here, with so much violence as to kill them. In this sea there is a considerable number of islands, which are mostly sandy. The Caspian abounds with a great variety of fish. The salmon is as good as that of Riga and Archangel, and even more fleshy and fat. The herrings too are remarkably large, and plumper than the English and Dutch, but not so tender. To these we may add the sterlet, two kinds of sturgeon, seals and porpoises. The birds most generally seen in the vicinity of this sea are storks, herons, bitterns, spoonbills, red geese, red ducks, and many others. The most beautiful of these is the red goose, which, though so called, is white, with the tips of the wings, the orbits of the eyes, the beak and feet, scarlet. It is about the size of a stork, has a long neck and high legs, is very savoury to the taste, and lives on fish. It may be denominated "*Ciconia, vel Ardea, rostro adunco lato brevi.*" A species of red wild ducks is also frequent, which fly in the evening to the tops of the trees or the roofs of houses, where they perform a noisy concert. Their flesh is well-tasted, not oily, though, like other water-fowl, they feed on fish. The leeches here are of two kinds, the hog-leech and the dog-leech. Their holes have two apertures, one towards the south and the other facing the north, which they open and shut according to the change of the wind. On the shore, between Terki and Derbent, grows a grass on which all the quadrupeds feed with avidity: to the horse alone the eating of it is fatal. They die upon the spot. Peter the Great is said to have caused an experiment to be made in his presence, and the common report was found to be true.

The ports of the Caspian may be divided into Russian, Persian, and Tartar. The Russian ports and trading places are Astrakhan, Gierief, and Kisar. The Persian havens are Derbent, Niezabad, Baku, Einzellee, Farabat, Medshetifar, and Astrabad. The Tartar havens are the bay of Balkan and Mangushlak. See each of these respectively.

The commerce of the Caspian is of a very ancient date; though at present it is not so considerable as it might be made. The exports amount in value to about 1,200,000, and the imports to about 1,000,000 of rubles. The articles of exportation are nearly the same with those that find purchasers on the Euxine, (which see); and in return scarcely any thing is taken but silk.

In ancient times Egypt long enjoyed a monopoly of the commerce by sea between the east and west, and hence it derived that extraordinary degree of opulence and power for which it was conspicuous. The kings of Egypt, by their attention to maritime affairs, had formed a powerful fleet, which gave them such decided command of the sea, that they could easily have crushed any rival in this kind of trade. The Persians, however, though they carried on no commercial intercourse at sea with India, were no less desirous than the people around them to possess its valuable productions and elegant manufactures; and accordingly these were conveyed to all the parts of their extensive dominions by land-carriage. The commodities, destined for the supply of the northern provinces, were transported on camels from the banks of the Indus to those of the Oxus, down the stream of which they were carried to the Caspian Sea, and distributed, partly by land-carriage, and partly by navigable rivers, through the different countries, bounded on one hand by the Caspian, and on the other by the Euxine Sea. The commodities, intended for the southern and interior provinces, proceeded by land from the Caspian gates to some of the great rivers, by which they were circulated through every part of the country. This was the ancient mode of intercourse with India, while the Persian empire was governed.

ed by its native princes. In the mean while the monarchs of Egypt were allowed to continue in the unmolested possession of the trade with India by sea: but though the sovereigns both of Egypt and of Syria laboured with emulation and ardour to secure to their subjects all the advantages of the Indian trade, the power of the Romans, by a series of revolutions, proved fatal to both. Having extended their dominion over Syria, they directed their victorious arms against Egypt, which was annexed to the Roman empire and reduced into the form of a Roman province by Augustus. As early as the 14th century the Venetians and Genoese, by means of the Caspian, brought the Indian, Persian, and Arabian commodities, with which they supplied the southern parts of Europe, through Astrachan to their magazines at Azof and Caffa. From Astrachan the goods were conveyed up the Volga, then by land to the Don, and afterwards forwarded down that river to the Azof. The northern part of this continent was likewise supplied, through Astrachan, with Asiatic goods, by the Russian traders, who sent them to their principal magazine at Wisby, a Hanseatic town in the isle of Gothland. The devastations occasioned by the wars of Timur or Tamerlane, towards the end of the 14th century, caused a transfer of this trade from Astrachan to Smyrna and Aleppo; and the Arabian commerce, more commodious for these parts, never returned to Astrachan; but part of the Persian traffic was afterwards restored to its old channel. While the provinces of Cafan and Astrachan remained under the government of the Tartars, the camp of the khan was a mart for the Russian and Persian merchants. But as, agreeably to the customs of the Tartars, this was frequently changed, Astrachan and Terki became at length two principal places of resort. This commerce, frequently obstructed and interrupted by numerous banditti, was precarious; until the conquest of Cafan and Astrachan opened a ready communication between Moscow and the Caspian Sea; Ivan Vassilievitch II. having garrisoned Astrachan with troops, rendered it the chief emporium of the eastern trade. See **ASTRAKHAN**. This conquest being completed in 1554, soon after the discovery of Archangel, the English obtained the czar's permission to pass through his dominions into Persia, and to carry on an exclusive trade over the Caspian. In 1558, Jenkinson, the first Englishman who navigated that sea, landed at Mangushlak upon the eastern shore, passed by land through the country of the Turcoman Tartars to Bokhara, capital of Great Bucharía, and returned to Moscow in the following year. In 1561 he again sailed over the Caspian, and, proceeding to the coast of Shirvan, went by land to Casbin, and obtained from the Sophy permission to trade into Persia. Several merchants followed his example. In 1597, Christopher Burroughs conducted an expedition, which was attended with many dangers, and at length arrived at Astrachan. During these expeditions, the traffic was chiefly confined to the ports of Tumen, Derbent, Baku, and the coast of Ghilan. This infant commerce was much impeded by the banditti that frequent the shores of the Caspian, and by the wars between the Turks and Persians; and therefore during above a century and a half no English vessel appeared upon this sea. At length, in 1741, the British merchants of St. Petersburg, at the persuasion of captain Elton, an Englishman in the Russian service, renewed the commerce, and established a factory at Reshd in the province of Ghilan. In consequence of some disputes with the Russians, he entered into the service of Nadir Shah, and assisted in constructing some vessels on the Caspian. This circumstance gave umbrage to the court of St. Petersburg; and Elizabeth, in 1746, withdrew her permission to

the English merchants of passing through her dominions for the Caspian commerce. On the death of Nadir Shah, who, by Elton's influence, had permitted the English to trade to Persia, their factory was pillaged by one of the pretenders to the throne, and their commerce annihilated.

The Russians pursued, with perseverance, the track opened by our merchants, and under Alexey Michaelovitch, Astrachan became the centre of the Persian trade; to which place merchants from Bucharía, Crim Tartary, Armenia, Persia, and even India, resorted. By the rebellion of the Cossacks of the Don, under Stenko Razin, and the devastations occasioned by it, the trade of Russia was annihilated. When this revolt was quelled, the greater part of the commerce fell into the hands of the Armenian merchants established in Astrachan, who settled factories in both the Russian and Persian territories. During this whole period the Russian and Armenian traders penetrated no further than Niezabad, a port between Derbent and Baku; and their chief settlement was at Shamakee, capital of Shirvan, until the year 1711, when that town was taken by the Lefgees, and the factory destroyed. In 1721, this commerce was renewed by Peter I. who obtained the cession of the provinces of Dagestan, Shirvan, Ghilan, and Masanderan, on the eastern and southern coasts of the Caspian. Soon afterwards he established a Russian mercantile company trading to the Caspian; the whole capital of which consisted only of 400 achins or shares, of the value of 150 rubles or 3*cl.* each. The chief settlements were formed at Astrachan and Kislar. As the possession of these distant provinces was very expensive, Anne restored them to the Sophy, on condition that the Russian merchants should enjoy liberty of trade to all the havens of the Caspian without paying duty, be allowed to build houses and magazines, and be subject to the laws of the country. The privileges of this company were confirmed by Anne and Elizabeth; but in 1762, Catharine II. abolished the exclusive right of this company, and permitted all her subjects to trade with Persia; prohibiting, on account of the numerous banditti that infest the roads, the inland traffic from Kislar, and the other Caspian ports to Shamakee. Two Russian consuls reside at Baku and Einzelsee. The Armenian merchants, however, carry on a contraband trade, and from their knowledge of the country and language, undersell the Russians. See **ASTRAKHAN**. In the year 1760, the exports and imports of the whole commerce, both by sea and land, to and from the Caspian Sea, amounted only to about 400,000 rubles; in 1768, to upwards of 800,000; and in 1775, to more than a million of rubles; without reckoning the contraband trade. At present it may be estimated at the same amount.

The fishery on the Caspian is the most important branch of this business in Russia. This is owing in a great measure to the excellent kinds of fish with which it abounds, to its commodious situation in the centre of the empire, facilitated by water communications, and the advantageous method in which this trade is prosecuted. Pallas observes, that the fishery on the Caspian is in some respects as important to Russia as the herring, the cod, and the whale fishery are to other maritime powers of Europe. The fishery on the northern or Russian shores of the Caspian is partly let out to merchants of Astrachan, whose great opulence is founded on it; and it partly belongs, in virtue of ancient privileges, to the Uralian Kozaks or Cossacks. See **ASTRAKHAN** and **URAL**.

As the Caspian is usually free from ice towards the latter end of March, the fishery commences about the middle of March or beginning of April; and it is carried on by several contractors,

CASPIAN SEA.

contractors, each of whom has his particular station or "vataga," commonly bearing the name of the proprietor. Every vataga is occupied by from 50 or 80 to 120 men, most of whom carry on a separate trade; and here are also pilots, fishermen, salters, preparers of isinglass and caviar, &c. The vatagas have also their own vessels of various dimensions and constructions; and near the habitations of the people that are employed are several sheds, where the roes are prepared, the isinglass dried, and the stock of fish kept in order. For preserving the salted fish, deep and well-secured ice-cellars of considerable magnitude are dug under ground, and they are furnished with large reservoirs, in which the fresh fish are pickled in a strong brine. There are various other conveniences adapted to the necessary operations. The taxes paid by the vatagas to the crown are rated according to the quantity of prepared roes and isinglass; and for every pood of isinglass five rubles, but for a pood of roes two rubles 80 kopecks are paid into the caiffe. In autumn and winter only the beluga is caught, which then collect into the bays, either for passing the winter or to spawn. About the middle of March, when the sea begins to be free from ice, myriads of little fish drive towards the shore; and of these the "obla," a sort of scale-fish, is caught and kept alive in wells, in order to furnish a supply for baiting the hooks while the season lasts. This fry is followed by prodigious swarms of ravenous belugas; and whilst this swarming lasts, a vessel may bring up within 24 hours 50 of them and more. The beluga is caught by means of a machine consisting of a rope 70 elis in length, to which 125 lines of the length of $1\frac{1}{2}$ fathom each, with as many large angling-hooks, are tied. This rope with its hooks is technically termed a nest, and 30 of these nests tied together commonly belong to a machine, which is therefore several hundred fathoms in length. Between every two nests a stone is tied of some pounds in weight, and the two ends of a whole machine are furnished with wooden anchors. The machine, when laid, is visited twice a day, and the hooks cautiously taken up along the rope. Passing a rope through the gills of the fish brought up, they let them down again into the water in order to bring them on shore alive. Here they are dragged with hooks to the beach, which is laid with planks, and cut up in the following order: the lower part of the stomach, with the guts, is thrown away; the fleshy gullet is salted for eating; the roe lies through the whole body adjoining to the entrails; this is taken out with the hands and cast into tubs, in which it is carried away by the caviar-makers; then follows the float or sounds, which runs along the whole back, and is given to the isinglass-makers. Lastly, they cut off the cartilage of the back, in order to extract the dorsal sinews, which are washed, hung upon poles, and dried in the air. The fish, being cleared of its entrails, the fat adhering about the melt and to the sides is scraped away with knives, collected into tubs, boiled down, and cleansed. This fresh fat, being of a good taste, is used during the salts instead of butter or oil. The cleansed fish are at last brought into the cellar above described, pickled in brine, and then strewed with salt, and laid up in courses on each other. When the shoaling of the beluga has ceased, the train of sevrugas comes on, which happens only once a year and lasts not much above two weeks. At one vataga, it is usual, with a favourable sea-breeze, to catch 16 and sometimes 20 thousand of these fish. The nets made use of for this purpose are so thick that the machines are only a span wide. Twenty-five of them are tied together and laid at the depth of one fathom on sunk posts, as the sevrugas go to shallow places. The largest of these

fish are never above $4\frac{1}{2}$ arshines (each arshine 28 English inches); but their roes, as well as their sounds, are much more esteemed than those of the beluga, and consequently bear a greater price. The flesh is partly salted down, and partly dried in the sun. In May, when the spring-capture on the sea-coast is over, the fishermen repair with their goods to Astrachan, where they are laid up in the store-cellars, and thence disposed of wholesale to the merchants of that city. The autumn-capture begins in the middle of September, and continues through the whole of October. The winter-capture begins as soon as the ice is set in on the sea, and lasts the whole winter. For taking the beluga in this season, the machine with the angling-hooks already described is set under the ice; through which apertures are cut at the distance of eight paces asunder, and through these the rope is introduced, by means of long poles. When two nests are tied together, the machine is fastened to a cross-pole, which rests on the brink of the aperture. The fish, when taken, are conveyed over the ice on sledges to the vataga, and thence carried to Astrachan. Besides the great vatagas, the proprietors of them have fishing-huts in different places on the sea-coast, where there is no capture of sturgeons, at which, mostly in summer, shad and barbel are taken with drag-nets. The shads here usually weigh eight pood (of 40 pounds each), and the barbel a pood and a half: the former are extremely fat in summer. The roes of this fish are thrown away, but of its sounds an ordinary sort of fish glue is made. For an account of other fisheries in the rivers that run into the Caspian Sea, see VOLGA and URAL. See also ASTRACHAN. The seal-capture, which is carried on by the more opulent part of the Astrachan merchants on the Caspian, is likewise very profitable. The seals are killed in spring and autumn on the islands, where they are immediately gutted and powdered with salt, and then brought to Astrachan, where they are slayed, and the tallow of them is melted. The Astrakans by salting their seals immediately on the spot gain this advantage, that the tallow is much cleaner and better than that of the seals taken at Archangel. The fishermen affirm, that the Caspian is incomparably richer in seals than any other sea on the Russian coasts. Robertson's *India*. Coxe's *Travels in Russia*, vol. iii. Tooke's *View of the Russian Empire*, vol. i. and iii.

Caspian Gates, *Caspie Pylæ*, or *Caspie Portæ*, in *Ancient Geography*, denote passes that lie between the mountains of Caucasus and the Caspian Sea. The name of Caspian or Albanian gates is properly applied to Derbend, which occupies a short declivity between the mountains and the sea: the city, if we give credit to local tradition, had been founded by the Greeks; and this dangerous entrance was fortified by the kings of Persia with a mole, double walls, and doors of iron. The *Iberian gates*, sometimes confounded by geographers with the *Caspian*, are formed by a narrow passage of six miles in mount Caucasus, which opens from the northern side of Iberia or Georgia, into the plain that reaches to the Tanais and the Volga. A fortress, designed by Alexander, perhaps, or one of his successors, commanded that important pass. Procopius, with some confusion, always denominates them Caspian. This pass is now styled "Tatar-topa," the Tartar-gates.

CASPII, a people who inhabited the environs of the Caspian Sea, called "Caspiana regio," to the west and the east of the river Cambyfes, between the Sopyrii and the Caspian Sea. They occupied also the country towards the north of this sea; and to the east of the Tigris, between Parthia and Media.

CASPIRA,

CASPIRA, now *Cashmere*, a town of India on this side of the Ganges, near mount Emodus, and towards the north of the source of the Hydaspes. See **CASHMERE**.

CASPIRÆI, a people of India on this side the Ganges, to whom Ptolemy has assigned 16 cities, of which Cragaula was the capital.

CASPIRIA, a name given by Ptolemy to the Fortunate Islands, situate in the Atlantic ocean.

CASPIRUS, a town of Asia on the frontiers of India, in the country of the Parthians, according to Herodotus, (cited by Steph. Byz.), who calls it Caspatyrus.

CASPIUS mons, the Caspian mountain, a name given by Ptolemy to a mountain which bounded the Greater Armenia. The ancients gave this name to two mountains; one, just mentioned, bounding Armenia; the other in Parthia.

CASQUE, in *Conchology*, a term among the French, synonymous with the Latin *Cassidea*, a genus of the univalve shells established in the new system of Bruguière for the reception of a particular family of the Linnæan Buccina. See **BUCCINUM** in article **CONCHOLOGY**.

CASQUE, in *Military Language*, &c. See **CASK**.

CASQUIPIBIAC, in *Geography*, a river of America, on the northern side of Chaleur bay, about a league from Black Cape, N.W. by N. in the bottom of Casquipibiac cove, at the distance of about one league from which is the great river Casquipibiac, lying west from the former, and affording a small cod and salmon fishery.

CASR. See **KASR**.

CASR band, a town of Persia, in the province of Meezan; 185 miles W. of Meezan.

CASSACONI, a canton of Golo, the department of the island of Corfica, according to the French arrangement, including 1,112 inhabitants.

CASSADA, or **CASSAVA**, in *Botany*. See **IATROPHA MANIHOT**.

CASSADGATH, in *Geography*, a lake of North America; N. lat. 62° 32'. W. long. 106° 15'.

CASSAGNAS, a town of France in the department of the Lozere, and district of Florac; eight miles S.E. of Florac.

CASSAGNE, LA, a town of France in the department of the Dordogne, seven miles S.E. of Montignac.

CASSAGNES, BEGONEZ, a town of France, in the department of Aveyron, and chief place of a canton in the district of Rodès or Rhodéz; 10 miles S. of Rhodéz. The place contains 1432, and the canton 7208 inhabitants: the territory comprehends 217½ kilometers and 22 communes.

CASSALAGAS, a town of Spain, in Old Castile; four leagues from Talavera.

CASSAMUNAIR, or **CASSUMUNIAIR**, in the *Materia Medica*, an aromatic vegetable drug, brought from the East Indies, highly valued as a nervine and stomachic, and reputed a specific in epileptic and convulsive diseases. It is supposed by some to be a species of galangal, by others of zedoary: its true name is not known, that of cassamunair being apparently feigned to hide it: of late it has been imported by the name of *bengalle*.

CASSANA, NICOLÒ, called *Nicoletto*, in *Biography*, a painter of history and portrait, distinguished by the beauty of his colouring, and the gracefulness of his figures, was born at Venice in 1659, and received instructions from his father Giovanni Francesco Cassana, a Genoese, who had been taught the art of painting by Bernardino Strozzi. At the court of the grand duke of Tuscany, whither he was invited, he distinguished himself by the portraits of that prince and his consort; and during his residence at Florence, he paint-

ed several historical subjects, of which the most considerable seems to have been the conspiracy of Catiline, consisting of nine figures as large as life, drawn to the knees; the two principal figures being represented as with one hand joined in the presence of their companions, and holding in the other a cup of blood. Nicoletto was also invited to England with flattering promises of encouragement: and on his arrival was introduced to queen Anne, whose portrait he painted, and who distinguished him by many tokens of favour: but his good fortune was of no long duration, as he died in London in 1713, universally regretted. Pilkington.

CASSANA, GIOVANNI AGOSTINO, called *L'Abate Cassana*, the younger brother of the preceding, was born in 1664, and after receiving the rudiments of his education from his father, finished his studies at Venice, where his brother Nicolo resided for some time. Although he was a good portrait or historical painter, he declined interfering with his brother in these departments of his art, and restricted himself to the representation of animals and various fruits, in which he excelled. His pictures of this class are frequent in the collections of Italy, and sometimes ascribed to Castiglione. He closed his life at Genoa, after having indulged a liberality and profusion, which his circumstances did not warrant, in neglect, indigence and wretchedness. He had a sister, Maria Vittoria Cassana, who painted images of devotion for private amateurs, and died at Venice in the beginning of the 17th century. Pilkington.

CASSANDER, a king of Macedon, was son of Antipater, and one of Alexander's chief captains. Upon the death of Alexander, and the subsequent division of his empire, the province of Caria was assigned to Cassander, and he was also appointed by his father general of the horse. When Antipater died, in the year B. C. 319, he bequeathed his high offices of protector and governor of Macedon to Polyperchon; by which preference the resentment of the ambitious Cassander was roused, so that he soon began to form a party for the subversion of the new protector's power. Accordingly he withdrew to the court of Antigonus, and having obtained some succours from him, sailed for Athens, and secured it. He afterwards marched to Macedon, for the purpose of opposing the tyranny of Olympias, widow of Philip, and mother of Alexander; and having besieged her in Pydna, he took possession of the place, and ordered her to be put to death. After her decease, he sent Roxana and her son Alexander to Amphipolis, where they were made prisoners; and thus set aside the line of Alexander, in Macedon, his own country. Cassander having provided for his own safety, assumed the government: built a new city in Pallene, which he called Cassandria, repaired many others, and by various measures manifested his inclination to restore peace and plenty to his native country. Having established tranquillity in Macedon, he returned into Greece in order to drive from thence Polyperchon, his son Alexander, who was protected by Antigonus, and his other enemies. In the mean while he rebuilt Boeotian Thebes, which had lain in ruins about 20 years, and caused it to be re-inhabited. After various military contests, the captains of Alexander became weary of the wars in which they had engaged with each other, and therefore unanimously desiring peace, it was easily concluded on the following conditions, viz. that each of them should retain possession of the provinces which then belonged to them; that the Greek cities should be free, and that they should be friends, and allies of each other. Cassander, in order the more effectually to secure himself in the possession of Macedon, put to death Roxana and her son Alexander, whom he had kept in a state of confinement;

anement; and he also engaged Polyperchon by liberal offers to murder Hercules, the son of Alexander by Barfine, whom he had set up as king of Macedon. In this state of imagined security, the Grecians formed a league against him, and with the support of Demetrius, the son of Antigonus, reduced him to great extremities. He succeeded, however, in forming a powerful alliance against Antigonus, who lost his life at the battle of Ipsus, B. C. 301. On the death of Antigonus, the princes confederated against him, divided his dominions among them, and Cassander recovered all that he had lately lost. Jealous of the power of Pyrrhus, king of Epirus, whom he had hated and persecuted from his infancy, he strengthened the frontiers of his own territories, repaired cities that were falling into decay, and built new ones in the most eligible situations, and particularly the famous city of Thessalonica, which was so named in honour of his wife. He endeavoured, also, by all the methods which policy suggested, to fix the attachment of his subjects to himself and his family. Whilst he was thus employed, a dropical complaint terminated his life, B. C. 298, after he had held the government of Macedon 19 years, during three of which the title of king had been appropriated to him by others, though he never himself assumed it. The political and military talents of Cassander have been universally allowed; but his ambition had no bounds, and rendered his character peculiarly odious. Alexander, whom he had offended in his youth, and who had treated him with severity, was the object of his invincible hatred and terror; and his enmity against him was indulged to such a degree, that he concerted measures for the utter extirpation of his family. *Anc. Un. Hist. vol. viii.*

CASSANDER, GEORGE, a learned divine, was born in 1515, in the isle of Cadfand, near Bruges, whence was formed his Latin name. He acquired a profound knowledge in the languages, polite literature, civil law, and divinity; and taught the belles lettres at Ghent, Bruges, and other places with great reputation. He afterwards directed almost his sole attention to theological studies, and retiring to Cologne, prosecuted his favourite idea of forming an union and reconciliation between those religious parties which at this period so much divided Europe. On this subject he published without his name, in 1562, a small work, entitled "De Officio Viri pii, &c." or, "On the Duty of a pious Man, and a sincere Lover of Peace, in religious Differences;" which, favouring the Roman Catholic church, on the general ground of authority, was attacked by Calvin, with his usual acrimony of style, on a supposition that it was written by Baudouin, a celebrated lawyer. When the true author was discovered, it was attacked a second time, by Calvin, and a temperate reply was written by Cassander. The sentiments displayed in this answer induced the German princes to fix upon Cassander as a mediator in the religious disputes. Under this character he composed his famous piece entitled "Consultatio Cassandri," in which he discusses the several articles of the Augsberg confession, stating their difference from the doctrines of the Catholic church, and the concessions that might be safely made with respect to them. This work, which was written with great liberality, was much applauded by those who were desirous of a coalition. Cassander closed his life in 1566, in his 53d year. M. De Thou represents him as modest, void of arrogance, and acrimony; and he was as ardent in his wishes for a religious union, and made as many concessions for the accomplishment of this object, as could be expected from a person who continued in the Catholic communion; but authority was an insuperable barrier. Cassander wrote several other works, which were first printed separately, and afterwards collected

into one volume, fol. Paris, 1616. Of these are "Liturgica," or "On the Rite and Order of the Celebration of the Lord's Supper;" "A Collection of Hymns," and of "Collected;" the "Decalogues of Vigilius, bishop of Trent, and his Books against Eutyches;" the "Treatise of Honorius on Predestination and Grace;" "On Infant Baptism, and on the Origin of the Anabaptist Sect;" "Letters to several Men of Eminence," chiefly on religious topics; "Rules and Precepts of Rhetoric and Logic;" "A Reduction of Greek and Roman Money to Flemish;" and some other small pieces. *Du Pin. Hist. Eccles. Thuani Hist. Moreri.*

CASSANDRA, in *Entomology*, one of the Fabrician species of *PHALÆNA*, (*Bombyx*), described from the Hungarian museum. The wings are ferruginous, with darker streaks; anterior part of the thorax chestnut.

Obf. Cramer describes a variety of the Fabrician *bombyx erythrina* as a distinct species under the name of *cassandra*.

CASSANDRA, *Gulf of*, in *Geography*, a bay on the coast of European Turkey, in the north-west part of the Archipelago, east of the gulf of Saloniki. It is so called on account of a small island of the same name that lies at its extremity; and it was formerly called "Toronaicus Sinus." *N. lat. 40°. E. long. 23° 44'.*

CASSANDRA *Nova*, a town of European Turkey, in the province of Macedonia, situate on the north coast of the entrance into the gulf of Saloniki; 15 miles E. of Saloniki.

CASSANDRA, in *Fabulous History*, daughter of Priam, king of Troy, and Hecuba, who is said to have received the gift of prophecy from Apollo, on condition of gratifying his passion. Having obtained the gift, she violated her engagement; and Apollo, being thus deceived, instead of revoking the grant, caused her to be considered as mad, and her predictions to be disregarded. Many of the predictions, which she delivered, during the impending calamities of Troy, were afterwards verified in the event. During the sack of that city, she fled for safety into the temple of Minerva, where she was barbarously violated by Ajax, the son of Oileus. See *AJAX Oiliades*. In the distribution of the plunder of Troy, Cassandra fell to the lot of Agamemnon, who took her home, where she excited the jealousy of Clytemnestra; so that she fell a victim, on occasion of the assassination of that prince. Cassandra was singularly beautiful, and had many suitors of distinguished rank in the flourishing time of Troy. She had a temple at Leuctra, in which a statue was erected to her honour, under the name of Alexandra, by which appellation she was as well known as by that of Cassandra. This appears from Lycophron's poem, still extant, entitled *Alexandra*, because it is a prophecy made, as the poet supposes, by Cassandra. This poet also speaks of a temple of Cassandra built by the Daonians, and by the inhabitants of the city of Dardanius; where her statue was resorted to as an asylum by young women who rejected their suitors on account of their uncomeliness or mean extraction. Plutarch says, that there was in Thalamæ, a city of Peloponnesus, an oracle of Paphæ; and that, as some writers reported, Cassandra died in that place, and was called Paphæ, because she delivered oracles to all who consulted her. *Gen. Dict.*

CASSANDRIA, in *Ancient Geography*, a maritime town of Macedonia, more anciently called *Potidea*, and rebuilt by Cassander, whence it derived its name. See *CASSANDRA*.

CASSANDRIA, in *Geography*, a town of Dutch Flanders, in the island of Cadfand; one league N. of Sluys.

CASSANITÆ, in *Ancient Geography*, a people of Arabia Felix, on the banks of the Red Sea.

CASSANO, in *Geography*, a town of Naples, in the province of Principato Ultra; 12 miles W. of Conza.—Also, a town of Naples, in the country of Bari; 15 miles S. of Bari.—Also, a town of Naples, in the province of Calabria Citra, the see of a bishop, suffragan of Cosenza; 21 miles N.W. of Rossano. N. lat. $39^{\circ} 55'$. E. long. $16^{\circ} 30'$.—Also, a town of the duchy of Milan, seated on the Adda; 16 miles N.E. of Milan. N. lat. $45^{\circ} 20'$. E. long. 10° .

CASSARANO, a town of Naples, in the province of Otranto; 8 miles W.N.W. of Alessano.

CASSAREEN, the ancient *Colonia Scillitana*, memorable for the martyrdom of its citizens, a town of Africa, in the inland country of the ancient Bizacium, and present kingdom of Tunis, seated on an eminence, 6 leagues W.S.W. of Spaitla. The river Derb runs winding below it; and upon a precipice that hangs over this river is a triumphal arch, with an attic structure above it, with some rude Corinthian-like ornaments upon the entablature, though the pilasters are Gothic. In the plains below Cassareen are several Mausolea, from which the town is said to derive its name; these appearing at a distance like so many Cassareen, i. e. towers or fortresses.

CASSATION, derived from the Latin *quassare*, to quash, or shake down, in the *Civil Law*, the act of abrogating, or annulling any act of procedure.

The occasions of cassation are, 1st, when a decree is directly contrary to another decree; and both against the same party. 2dly, When decrees are directly contrary to the express decision of statutes or customs. 3ly, When the formalities prescribed by the laws have not been observed.

CASSE, in *Military Language*, a breaking or cashiering, is a disgraceful or an ignominious deprivation of, or dismissal from, any military office, rank, situation, or employment.

This punishment has been and may be extended to an entire corps, to a company, to an officer, to a non-commissioned officer, or to a soldier of a chosen or select company.

To break or cashier a body of troops, as a regiment or a company, for example, is to degrade and depose or dismiss it after having adjudged it guilty of an offence that renders it unworthy of serving its country.

To break or cashier an officer, is to deprive him of, or dismiss him from, his employment, because his conduct and behaviour have been unworthy of, or unbecoming the rank he holds, or because he has been guilty of some great offence against military discipline.

To break or cashier a non-commissioned officer is, to withdraw from him the authority he was entrusted with, to deprive him of the employment he filled, and to reduce him to the condition of a common soldier.

And to break or cashier a soldier or member of a chosen, particular, or select company, as a grenadier, for instance, is to send him back to the company from which he was taken or selected, after shewing him to be undeserving or unworthy of the distinguished situation he was placed in.

The practice of breaking or cashiering whole regiments or companies ignominiously, for misconduct or misbehaviour, is now, however, and perhaps, with reason, altogether laid aside. For, let a regiment or company behave ever so ill, it rarely, or rather never happens, that every individual in it is in fault. Some other military punishment should, therefore, be adopted, that has a tendency to make those in a company or other body of troops, who are naturally disposed to behave well, feel interested in the good behaviour of the rest, and act as a check on them. The Romans had a practice which was admirably calculated to produce this effect. When a manipule, cohort, or other body of their troops be-

haved ill in the face of an enemy, or were guilty of any thing disgraceful to the military character; they, in the most public manner, drew out from the body, by lot, every tenth man for punishment, which was inflicted without mercy. The others that remained, or on whom the lot did not fall, were fed on barley instead of wheat, and were lodged without the entrenchment exposed to the insults of the enemy. Such an institution was well contrived both for impressing terror and for preventing military offences and misconduct.

CASSE-noisette, Buff. in *Ornithology*, the blue-capped manakin of English writers, and *pipra manacus*, which see.

CASSE noir, the name given by Buffon to the nut-cracker, *corvus caryocatactes*, which see.

CASSEBOHM, FREDERIC, in *Biography*, professor of anatomy at Hall in Saxony, was one of the pupils to Winslow, and approved himself a diligent and expert anatomist. He laboured, in a particular manner, to acquire a knowledge of the structure of the human ear, at different periods of life, from the embryo of three months, to its perfection in the adult. In 1734, he published, as the result of his experiments to that time, "*Tractatus quatuor Anatomici de Aure Humana, Tribus Figurarum Tabulis illustrati*," 4to. They contain more complete and exact descriptions of all the parts of the ear, the bony structure, muscles, nerves, and vessels, than were before extant. The following year he added two other dissertations on the same subject, completing his design. He had before, viz. in 1730, published "*De Differentia Fœtus et Adulti*," Hall, 4to. in which, among other things, he notices the descent of the testicles from the cavity of the abdomen into the scrotum. "*Methodus secandi Musculos, et Methodus secandi Viscera*," both published in 1740, in 8vo. contain useful rules for the assistance of the young anatomist. They were only parts, however, of a larger work intended to contain the anatomy of the whole body, which, by an early death, he was prevented completing. Haller was in possession of his manuscript, which he describes as containing much valuable matter. See his Bib. Anatom.

CASSEDE, in *Geography*, a town of Spain, in Navarre; 2 leagues from Sangüesa.

CASSEELAS, a town of America, in the state of Georgia; 165 miles W.S.W. of Augusta.

CASSEL, a city of Germany, the capital of the landgrate of Hesse-Cassel, in the circle of the Upper Rhine. It is divided by the river Fulda into the Old and New Towns, which are united by a bridge: the former is the largest, but ill built; the streets are narrow and winding, and the houses irregular, old, and mostly constructed with timber. The New town is divided into Upper and Lower, the latter being small and as ill built as the Old town. The Upper New town, called also the French town, from its having been first inhabited by French Protestants, who sought a refuge here after the revocation of the edict of Nantz, is reckoned beautiful. The streets are wide and straight; the houses uniformly built in a good style, with many magnificent palaces and public edifices. The manège is light and elegant; the pavilion exhibits a good style of architecture, and is pleasantly situated in gardens richly decorated and perfumed with orange trees, and enlivened by the cheerful notes of Canary birds, which fly wild and unconfined about them; the museum, built by the landgrave, Frederick II., to whom the town owes many of its public ornaments, is a noble building, and contains a valuable collection of antique gems and ornaments, stuffed beasts, statues, busts, and cork models of Rome, and a curious burning-glass, &c.; the library is a magnificent room, about 500 feet long and

40 broad; and contains, among other valuable books and MSS., a MS. of Thucydides, an Hebrew MS. collated for Dr. Kennicott, and a Latin Bible, printed at Mentz, in 1562, by John Fuft and Peter Schæffer. It has also a theatre, an anatomical theatre, and several churches. Romish and Calvinistical churches are allowed, but they are not suffered to have any bells. At Cassel there are several manufactures of cloth and woollen stuffs, fine hats, gold and silver lace, stockings of worsted and silk, tobacco, earthenware in imitation of China, &c. The town, which has been often injured by war, contains about 22,000 inhabitants. It is 84 miles N.E. of Coblenz, and 34 N.N.E. of Mentz. N. lat. $51^{\circ} 19' 4''$. E. long. $9^{\circ} 29'$.

CASSEL, a town or village of Germany, in the circle of the Lower Rhine, situate on the Maine, opposite to Mentz, with which it communicates by a bridge of boats. It was taken by the French in 1792, and fortified by them; but in the next year it was set on fire in the siege of Metz, when it was retaken by the Prussians.

CASSEL, a town of France, in the department of the North, and chief place of a canton, in the district of Hazebrouck, seated on a hill which commands an extensive view of the country, including 32 cities and towns, and the castle of Dover; $7\frac{1}{2}$ posts E.S.E. of Calais, and 6 posts W.N.W. of Lille. N. lat. $50^{\circ} 48'$. E. long. $2^{\circ} 27'$. The place contains 3,601, and the canton 13,200 inhabitants: the territory includes 120 kilometres and 13 communes.

CASSENIEU, a town of France, in the department of the Charente, and district of La Rochefoucault, 6 miles N.E. of La Rochefoucault.

CASSENTINO, JACOPO DI, in *Biography*, a painter of history and portrait, was born at Cassentino in 1276, and learned the art of painting from Taddeo Gaddi. He was regarded, in his time, as an artist of considerable merit, both in fresco and distemper; and executed many works in his native city, in Arezzo, and in Florence; and in 1350, became the founder of the Florentine academy. He died in 1356. His most memorable work was that which he painted in the chapel of his academy, representing St. Luke drawing the portrait of the Virgin, on one side of which were all the academicians, 10 in number, and on the opposite side all their wives. Pilkington.

CASSER, in *Geography*, a town of Asia, in the Arabian Irak, on the Tigris; 120 miles S.E. of Bagdad.

CASSERES, a river of Africa, which runs into the sea, to the north of the river Sierra Leona.

CASSERIUS, JULIUS, in *Biography*, a distinguished anatomist of humble parentage, but of great talents, was born at Placentia in 1545. His genius leading him to the study of anatomy, he went to Padua, and became a servant to Fabricius, who, discovering his propensity, made him his pupil, and, in succession, his assistant, and, at length, coadjutor in the professorship of anatomy. To this honour he was preferred in the year 1609, and he continued to fill the office with credit until the year 1616, when he died. As his diligence and industry equalled his genius, he became, in a few years, more knowing and skilful in his profession than his preceptor. Fabricius, in the opinion of Douglass, excelled in philosophy, Casserius in anatomy. This excited, however, no jealousy. Fabricius, who was far advanced in years, was well pleased with the prospect of leaving a successor, so well qualified to advance the knowledge of the art; but in this he was disappointed, as he survived his pupil by more than three years. He was succeeded by Spigelius, who had been their common pupil. Of Casserius's anxious desire to leave behind him a name, we have numerous proofs. Almost the whole of the revenue he obtained by teaching

anatomy was expended in procuring subjects for dissection, and in paying draughtsmen and engravers to delineate figures of such parts of the body as he either discovered, or thought he had juster conceptions of than his predecessors. In the prefaces to his anatomical works he is not backward in affirming that he has furnished future anatomists with delineations of the parts of human and animal bodies, exceeding in elegance, perspicuity, and correctness, all that had preceded them. It will be observed he made use of animals, not as succedanea, but only to enable him to discover minute parts which were not easily distinguishable in the human body. In giving this account, principally from Douglass's Specimen and the Dict. Histor. of Med. Eloy. we cannot help observing in how many points, in genius, in industry, and zeal for the advancement of the art, a late celebrated anatomist, Mr. John Hunter, resembled the character we are here depicting. The title of his first work, published in 1600, is, "De Vocis Auditusque Organis Historia Anatomica, &c. Tractatus duobus explicata, Ferrara, fol. *Figuræ partium tam in homine, quam in multis aliis animantibus, tabulis 33 comprehensæ sunt.*" He here lays claim to the discovery of a muscle, moving the malleus, one of the ossiculæ auditus. He also improved, Haller says, the anatomy of the larynx. "Pentasthefejon, id est, de quinque Sensibus Liber, Organorum Fabricam, Actionem, et Usus continens, Venet. 1609, fol. *Iconibus fideliter ære incisus illustratum.*" This is an extension of the former work to the rest of the senses, executed with equal skill. They have both been several times reprinted. It was not until some years after the death of Spigelius, which happened in 1622, that the remainder of Casserius's works, consisting of 78 anatomical plates, with the explanations, was published. Bucretius, to whom Spigelius had left the care of his productions, incorporated the works of Casserius with them, and published them together in royal folio, in 1627, at Venice. Two of the plates by Casserius, viz. one representing the placenta, and another the hymen, are printed with Spigelius's work, "De Formato Fœtu," fol. 1627. Douglass, Bib. Anat. Spec. Haller Bib. Anat. Eloy. Dict. Hist.

CASSETTES, or COFFINS, in the *Manufacture of China Wares*, are utensils made of Stourbridge or other good potter's clay with a third of sand, in which the China ware is baked. They are generally made of a round form, with a flat bottom. They are either turned or formed in a mould. See PORCELAIN.

CASSI-*ascher*, a name given to the grand provost of the Turkish armies.

CASSIA, in *Botany*, (κασσις, Diosc.; κασις, Theophrast.) in its original acceptation, is the name of an oriental shrub, the bark of which has been held in high estimation, from the earliest antiquity, on account of its aromatic qualities, which resemble those of cinnamon. The grammarians who for the most part think it better to invent a bad etymology than go entirely without one, tell us, that it is called *κασις* *απο το κασαι*, ab ornando, quasi *κασμεται δια της ευσμιας της αισθησεως*, quod sua fragrantia sensus ornat. But the word is indisputably of Asiatic origin, and was brought into Greece, along with the commercial article which it denoted, by the Phœnician merchants. It is no other than the קַצְיָה, ketsieh, of the Hebrews and other orientals. In the books of the Old Testament it occurs, indeed, only once, and that in the plural number. "Thou lovest righteousness and hatest wickedness: therefore God, thy God, hath anointed thee with the oil of gladness above thy fellows. All thy garments smell of myrrh and aloes, and cassia." Pf. xlv. 7, 8. This psalm, we apprehend, may be referred without hesitation to the reign of Solomon. The plural termination was probably

bably adopted by the Hebrews, on account of the small detached pieces into which the bark was usually divided when it came into the hands of the merchants; but the seventy in conformity with the general usage of Greek writers, give it in the singular number and with a single σ , which appears to be the original orthography. But though the Phœnicians communicated the name to the Greeks, they did not themselves adopt that by which this precious commodity was known in its native climate. In the Hebrew language, of which the Syro-Phœnician is only a different dialect, the verb קצץ signifies to strip any thing of its covering; and thence was naturally applied in a substantive form to denote the bark of a tree separated from the trunk: and the high value which was set on the aromatic bark brought from the remotest regions of the then known earth, might as naturally cause it to be called bark by way of eminence; in the same manner as another kind of bark is thus distinguished in modern times. The word cassia occurs in two other passages of our common translation of the Old Testament: Exod. xxx. 24. Ezek. xxvii. 19.; but in these the original קר, which the septuagint in Exodus render $\kappa\alpha\varsigma\iota\alpha$, in Ezekiel appear not to have had in their copies. It was probably somewhat different from Cassia; but from its connection in the book of Exodus with myrrh, cinnamon, and sweet calamus, appears to have come from the same countries, and to have possessed similar properties.

This oriental aromatic is the cassia of modern cookery, but not of modern botany. We must, therefore, refer for its character and history to the article *laurus*, under which genus it is now placed.

The naturalist has often reason to lament that travellers and merchants have given the name of one thing long known to another recently discovered, on account of a real or fancied resemblance in a single particular, although in every other respect it is entirely different. Such has been the fate of cassia. The Romans used the word with considerable latitude. When Virgil, extolling the simple fare of the happy husbandman, says,

"Nec casia liquidi corrumpitur usus olivi,"

he cannot be supposed to speak of the casia which he mentions in his second eclogue, as interwoven with the flowers of the violet, poppy, narcissus, and sweet smelling anise in the garland made for Alexis by the naiad. In the former passage he undoubtedly alludes to the aromatic bark which the luxurious citizens of Rome infused in their table and culinary oil to give it a grateful smell and flavour. In the latter he must have intended some odoriferous herb, or shrub, which is a native of Italy; but by what name it is now known cannot easily be determined.

In the middle ages, the Arabian and Greek physicians, as appears from the writings of Avicenna and Myrepsus, acknowledged two kinds of cassia; one, cassia aromatica, a native of India, the cassia of the ancients; the other, cassia solutiva, a native of Egypt, totally different in its general appearance, botanical characters, and medical qualities; and which appears to have been honoured with the same name as that which from time immemorial had distinguished the precious oriental spice, merely on account of its pleasant smell; for we are informed by Alpinus, that when he was in Egypt in the latter part of the sixteenth century, the natives took great delight in walking early in the morning in the spring season near plantations of this kind of cassia, and regaling themselves with the fragrance of its flowers. To this species, and its numerous congeners, the term cassia, as a generic appellation, is confined by modern botanists.

Linn. gen. 514. Schreb. 700. Juss. p. 348. Vent. vol. iii. p. 371. Gært. 755, 756. Tourn. Cl. 21. § 5. gen. 1.

3. Class and order, *decandria monogynia*. Nat. ord. *Lomentaceæ*, Linn. *Leguminosæ*, Juss.

Gen. Ch. *Cal.* Perianth five-leaved, (five-cleft, Gært. Juss.) lax, concave, coloured, deciduous. *Cor.* Petals five, roundish, concave; lower ones more distant, more spreading, larger. *Stam.* Filaments ten, declined; the three inferior ones longer; three inferior anthers very large, arcuate, beaked, opening at the tip; three lateral ones without a beak; three upper ones very small, barren. *Pist.* Germ somewhat cylindrical, long, pedicelled; style very short; stigma obtuse, ascending. *Peric.* Legume oblong, with transverse partitions. *Seeds* several, roundish, affixed to the upper future.

Eff. Ch. *Calyx* five-leaved. *Petals* five; three upper anthers barren; three lower ones beaked. *Fruit* a legume.

Obf. Tournefort divided the genus into two; cassia with oblong legumes, entire partitions, and generally pulpy cells; and fenna, with gibbous, inflexed partitions, and very thin partitions. Gærtner has adopted his two genera with the following essential characters.

Senna. *Calyx* five-cleft, deciduous. *Cor.* Petals five, lower ones larger. *Stamens* ten, separate; three upper anthers barren, the rest fertile: three lower ones arcuate. *Legume* membranous, many-celled. *Seeds* albuminous. *Embryo* straight.

Cassia. *Flower* as in fenna. *Legume* long, cylindrical, woody, not opening by valves, many-celled; cells filled with pulp. *Seeds* albuminous; albumen with a chink on each side. *Embryo* straight.

Sp. 1. *C. diphylla*, Linn. Sp. Pl. 1. Mart. 1. Lam. 1. Willd. 1. (*Niella-warei* Indorum, Burm. Fl. Ind. 94.) "Leaves conjugate; stipules cordate-lanceolate." A shrub.

Stem cylindrical. *Leaves* on a short petiole; leaflets two, semi-orbicular, obtuse, striated. *Stipules* covering the branches. A native of the East Indies. La Marck observes that it must have been marked as an annual in the Species Plantarum by mistake; for no shrub can be an annual.

2. *C. Abfus*, Linn. Sp. Pl. 2. Mart. 3. Lam. 2. Willd. 2. (*Senna quadrifolia*, Burm. Zeyl. 212. tab. 97. *Senna exigua*, &c. Pluk. alm. 341. tab. 60. fig. 1. *Loto affinis* Ægyptiaca, Bauh. pin. 332. *Abfus*, Alp. Ægypt. 97.)

"Leaflets in two pairs, inversely egg-shaped; with two awl-shaped glands between the lowest." Root annual. *Stem* herbaceous, scarcely a foot high, weak, villous, branched. *Leaves* alternate. *Flowers* reddish, marked with purple veins, axillary, two or three together; peduncles shorter than the leaves. *Legumes* about an inch long, compressed, hispid. *Seeds* from four to six, blackish, shining. 3. *C. viminea*, Linn. Sp. Pl. 2. Mart. 4. Lam. 3. Willd. 3. Brown, Jam. 223. Sloane Jam. 2. 49. tab. 189. fig. 6, 7. Swartz obs. 156.

"Leaflets in two pairs, ovate-oblong, acuminate; with an oblong gland between the lowest; and an obsolete, three-toothed spine, or callous scale under each petiole." A shrub.

Stem forty or fifty feet high, striated, stiff; branches divaricated, loose, stiffish, round, striated, smooth, spinous when old. *Leaflets* petioled, entire, nerved, veined, very smooth; lower pair bent down, spreading; upper pair bent down perpendicularly, approximating; general petioles thickened at the base, round, usually directed one way. *Flowers* numerous, large, in axillary racemes, on long peduncles; calyx-leaves egg-shaped, reflexed, spreading, small, pale green; four upper petals smaller, egg-shaped, with claws; the fifth largish, concave; germ linear, longer than the corolla, curved back. *Legume* short, compressed. Swartz.

A native of Jamaica in the woods of the higher mountains, in the anterior of the island. 4. *C. bacillaris*, Linn. jun. Supp. p. 231. Mart. 2. Lam. 4. Willd. 4. (*C. fruticosa*, Mill. dict. 10. Mart. 39. *C. americana tetraphylla*, Hoult. Reliq.

CASSIA.

Reliq. tab. 17.) "Leaflets egg-shaped, oblique, in two pairs, with an obtuse gland between the lowest; racemes axillary, peduncled; legumes cylindrical, long." A shrub, twelve feet high, very smooth. *Leaves* alternate, petioled; leaflets smooth on both sides; lower ones exactly egg-shaped; upper ones more elongated. *Stipules* none. *Flowers* orange, of a middling size; racemes solitary, few-flowered, erect; pedicels dependent, angular. *Legume* so like that of *C. fistula* as not to be distinguished from it. A native of Surinam and Vera Cruz. Miller attributes terminal racemes to his *C. fruticosa*, but as La Marck refers Houftoun's figure to *bacillaris*, and as Miller's description agrees sufficiently with that of the younger Linnæus, we have ventured to consider them as one and the same species. 5. *C. arborea*, (*C. arborefcens*, Mart. 40. Mill. dict. 15. Houft. MSS.) "Leaflets in two pairs, oblong-egg-shaped, villous underneath; flowers in corymbs; stem erect, arboreous." *Trunk* twenty-five or thirty feet high, much branched. *Leaves* on long petioles; leaflets four inches long, near two broad. *Flowers* deep yellow, inclining to orange, lateral and terminal; lateral ones few, scattered; terminal in large round branches, proceeding from one centre. *Legumes* near nine inches long, compressed, with a border on each side. *Seeds* oval, smooth, compressed. A native of Vera Cruz. 6. *C. tetraphylla*, Mart. 44. (*C. procumbens*, Mill. dict. 20. Houft. MSS.) "Leaflets in two pairs, egg-shaped; flowers solitary, axillary; legumes hirsute; stems procumbent." *Root* annual. *Stems* about two feet long, herbaceous. *Leaves* on long petioles, at a considerable distance from each other. *Flowers* pale yellow. *Legumes* short, flat. *Seeds* flat. A native of Vera Cruz. 7. *C. Tagera*, Linn. Sp. Pl. 5. Mill. 5. Lam. 6. Willd. 5. (*Tagera*, Rheed. Mal. 2. p. 103. tab. 52? Rai. hist. p. 1743. Cassia 6. Senna spuria, &c. Amm. herb. 603. 33?) "Leaflets in three (two) pairs; gland petiolar; stipules ciliated, heart shaped, acuminate." Linn. "Leaflets in two pairs, inversely egg-shaped; peduncles one-flowered, very short; legumes narrow, linear." Lam. A shrub. *Stem* procumbent; branches filiform. *Leaflets* four, semi-orbicular, veined, the two outer ones larger; petioles very short. Linn. *Stem* three or four feet high, hard, cylindrical, greenish. *Leaves* alternate; leaflets thickish, flat, with parallel nerves, the two upper ones largest. *Flowers* yellow, axillary. A native of Malabar. La Marck questions whether his plant be the *tagera* of Linnæus, and observes that it is distinguished from the next species by the number of its leaflets. We are persuaded that *trijugis* in Linnæus's specific character is merely an error of the press. 8. *C. Tora*, Linn. Sp. Pl. 5. Mart. 6. Lam. 7. Willd. 6. (*Senna orientalis*, tala Zeylanensium Herm. Lugd. 557. Rai. hist. 1743. Galega indica, Rai. hist. 911. Gallinaria rotundifolia, Rumph. Amb. 5. p. 283. tab. 97. fig. 2. Cassia filiquis fœni Græci, Plum. spec. 18. tab. 76. fig. 2. Cassia filiqua quadrang., Dill. Elth. 72. tab. 73. fig. 73.) "Leaflets in three pairs, inversely egg-shaped; outer ones larger; an awl-shaped gland between the four lower ones." Linn. "Leaflets in three pairs, inversely egg-shaped; peduncles short, generally one-flowered; legumes linear, long, very narrow." Lam. *Root* annual. *Stem* from one to two feet high, herbaceous, upright, cylindrical, sometimes simple, more frequently branched, smooth. *Leaves* alternate; leaflets smooth, somewhat glaucous, with a pointed gland between each of the lower ones; stipules linear, brittle-shaped, a little villous. *Flowers* yellowish, axillary. *Legumes* from four to six inches long, with a small border on each side, more or less curved, smooth. A native of the East Indies. 9. *C. limensis*, Lam. 8. Miller Dict. tab. 82? "Leaflets in three or four pairs, inversely egg-shaped, very obtuse; smooth;

racemes peduncled, elongated, axillary." Nearly allied to the preceding, but easily distinguished from it by the inflorescence. *Root* annual. *Stem* a foot and a half high, smooth, slightly angular towards the summit, somewhat branched. *Leaves* becoming larger as they increase in distance from the root; lowest ones with only one pair of leaflets, those above with two, those still higher with three, and those near the summit sometimes four; stipules awl-shaped. *Flowers* yellowish; from seven to ten together in peduncled axillary racemes. Found by Dombey about Lima. 10. *C. bicapsularis*, Linn. Sp. Pl. 6. Mart. 7. Lam. 9. Willd. 7. (*C. hexaphylla*; filiqua bicapsulari, Plum. Spec. 18. Burm. Amer. tab. 76. fig. 1.) "Leaflets in three pairs, inversely egg-shaped, smooth; inner ones rounder, with a globular gland between them." A shrub. *Stem* six or eight feet high, single, branched near the summit; branches cylindrical, greenish. *Leaves* alternate. *Flowers* bright yellow, veined; from three to five together in axillary, peduncled racemes, seldom longer than the leaves. *Legumes*, according to Plumier, long, cylindrical, divided in their whole length into two cells, forming contiguous tubes. La Marck, from a living plant in flower, but not perfecting its fruit. A native of South America. The *bicapsularis* of Miller is an annual plant, a foot and half high; with an erect, herbaceous stem, three pair of oval leaflets to each leaf; the flowers yellow, small, axillary, solitary; pods taper; a native of the West Indies and Madeira. It must therefore, as professor Martyn observes, be a different species. 11. *C. emarginata*, Linn. Sp. Pl. 7. Mart. 8. Lam. 10. Willd. 8. (*C. minor hexaphylla*, fœnæ foliis; Sloane Jam. 2. p. 44. tab. 180. fig. 1, 2, 3, 4. Brown Jam. 223. 3. Swartz. Obs. 157. *C. racemosa*; Mill. Dict. 19.) "Leaflets in three pairs, egg-shaped, rounded, emarginate, equal." Linn. "Leaflets in three or four pairs, egg-shaped, almost entire; flowers in irregular racemes; stem arboreous." Swartz. A small tree. *Trunk* ten or twelve feet high; branches round, ash-coloured, pubescent. *Leaves* scattered, spreading; on round pubescent petioles, two inches long; leaflets petioled, blunt, nerved, thickish, tomentous, hoary underneath. *Flowers* yellow; racemes axillary, solitary, spreading, shorter than the leaves, many-flowered; three leaflets of the calyx larger, ovate-oblong, spreading, concave-arched, pubescent on the outside; petals unequal; upper one larger, in shape of the letter S placed obliquely, concave, waved at the edge; filaments very short, equal, awl-shaped; anthers thick, curved in, fertile. *Legume* flat, broad. Swartz. A native of Jamaica, where it is called the fœna tree. Its leaves are purgative, and are sometimes used instead of the true fœna. The pulp of the legumes has the same flavour and the same medicinal qualities as cassia fistula. 12. *C. obtusifolia*, Linn. Sp. Pl. 8. Mart. 9. Lam. 11. Willd. 9. Swartz. Ob. 158. (*C. americana foliis subrotundis*; Tourn. 6. 9. *C. fœtida*; Dill. Elth. 71. tab. 62. fig. 72. *Senna minor*, Sloan. Jam. 2. p. 47. tab. 180. fig. 5.) "Leaflets in three pairs, egg-shaped, rather obtuse." *Root* annual. *Stem* two feet high, cylindrical, smooth, greenish, herbaceous but strong, branched. *Leaflets* a little narrowed towards the base, obtuse, with a small point at the summit, green, soft; upper ones larger; petioles a little villous; a conical gland between the lower pair. *Flowers* in short axillary racemes near the top of the stem and branches. Lam. A native of the West Indies. 13. *C. fenoides*, Willd. 10. Ic. rar. 1. p. 70. Collect. 1. p. 74. "Leaflets in three pairs, elliptical, obtuse, with a gland between the lowest pair." A tree. *Stipules* awl-shaped. A native of the East Indies. 14. *C. acuminata*, Willd. 11. (*C. apoucouira*; Lam. 5. Aubl. guian. 1. p. 379. tab. 146.) "Leaflets in three pairs, egg-shaped, acuminate, with a

filile

sessile gland between each pair." A tree. *Trunk* seven or eight inches in diameter, branches spreading. *Leaves* alternate; leaflets sessile, smooth, the upper ones the largest; petiole winged, ending in a short point. *Flowers* yellow, with red veins, in small racemes which are either axillary or on the naked part of the stem and branches. A native of Guiana. 15. *C. corymbosa*, Lam. 12. Willd. 12. Bot. Mag. 633. "Leaflets in three pairs, lanceolate, somewhat falcate, smooth; a gland between the lowest; corymbs peduncled, axillary, legumes cylindrical." A shrub. *Stem* about six feet high, brown, dotted, rough, about the thickness of a finger, branching near the top into a loose but tolerably regular head. *Branches* smooth, cylindrical, greenish, small. *Leaflets* green, quite smooth; upper ones longer, narrower, and most falcate. *Flowers* bright yellow, from five to seven in a corymb. *Legumes* inflated, cylindrical, an inch and half long, four lines thick, straight, quite smooth. A native of South America about Buenos Ayres, described by La Marck from a living plant, and a dried specimen of the legume gathered by Commerçon. 16. *C. villosa*, Mart. 41. Miller Dict. 4. Hoult. MSS. "Leaflets in three pairs, oblong-ovate, equal, villous; pods jointed; stem erect, arborescent." A tree. *Trunk* fourteen or sixteen feet high; branches numerous. *Flowers* pale straw-colour, small, in loose terminal branches. *Legumes* long, narrow, jointed. *Seeds* oval, brown, each lodged in a sort of isthmus. A native of Campeachy. 17. *C. uniflora*, Mart. 42. Mil. Dict. 5. Hoult. MSS. "Leaflets in three pairs, ovate-acuminate, villous; flowers solitary, axillary; legumes erect." *Root* annual. *Stem* single, seldom more than a foot high, herbaceous. *Flowers* pale yellow, small. *Legumes* two inches long, narrow, taper. A native of Campachy. 18. *C. longifiliqua*, Linn. jun. Supp. p. 230. Mart. 11. Lam. 13. Willd. 13. (*C. arborefcens* diffusa; Brown Jam. p. 223.) "Leaflets in four pairs; upper ones lanceolate; an awl-shaped gland below the lower ones and between the upper ones." *Root* perennial. *Stem* erect, somewhat cylindrical, obtusely furrowed; branches scarcely pubescent. *Leaflets* green, paler underneath, obovate-oblong, quite smooth; upper ones rather linear than lanceolate; an oblong-awl-shaped gland between or below the lowest pair, a more acute one between the uppermost, seldom any between the intermediate ones; petiole erect, roundish. *Stipules* linear, acute, short. *Legume* tetragonous, hairy, short. It sleeps during the night with its petioles closely erected, and its leaflets pendulous near the stem. A native of America. 19. *C. minima*, Mart. 45. (*C. biflora*; Mill. Dict. 14. Hoult. MSS.) "Leaflets in four pairs, oblong-ovate; stems procumbent; flowers axillary; peduncles two-flowered." *Root* annual. *Stems* two or three, slender, pubescent. *Leaflets* pale green, roundish. *Flowers* small, yellow; peduncles jointed. 20. *C. falcata*, Linn. Sp. Pl. 10. Mart. 10. Lam. 14. Willd. 14. "Leaflets in four pairs, ovate-lanceolate, retrofalcate; a gland at the base of the petioles." *Root* annual. *Leaflets* tapering to the base, almost sessile; the inner side broadest; outer side most narrowed near the base, so that they appear curved backwards. A native of America. 21. *C. sericea*, Mart. 49. Willd. 15. Swartz. prod. 66. Flor. Ind. Occid. 2. p. 724. (*C. sensitiva*; Jacq. ic. rar. 3. tab. 459. Collect. 2. p. 362. Paiomirioba 2. Pis. Bras. 185.) "Leaflets in about four pairs, egg-shaped, hairy, with an awl-shaped gland between each pair; peduncles four-flowered; legumes tetragonal." *Root* annual. *Leaflets* ciliated. A native of Jamaica in open spots on the less elevated mountains. 22. *C. grandiflora*, (*C. Chinenfis*; Lam. 15. Vanzian-nam seu Telo-dzin-zan Sinenfium. Conf. Flos flavus; Rumph. Amb. 4. p. 63. tab. 23.) "Leaflets in five pairs,

egg-shaped, pubescent at the edges; peduncles axillary, short, generally three-flowered; flowers large." *Stem* shrub-like, two or three feet high, herbaceous, erect, angular, a little villous at its summit. *Leaflets* green, soft, with a sessile globular gland between the lower pair. *Flowers* bright yellow, remarkably large. Described by La Marck from a living plant, said to come originally from China. As the *Chinenfis* of Willdenow appears to be a different species (see n. 37.), we have found it necessary to give a new trivial name to the present. 23. *C. ornithopoides*, Lam. 16. "Leaflets in four pairs, ovate-wedge-shaped, pointed; legumes linear, jointed, erect, tomentous, terminating in a recurved point." *Stem* a little angular, scarcely ligneous, covered near its summit with a rust-coloured down. *Leaves* alternate, short; leaflets tomentous on both sides; their edges, nerves, and petioles rust-coloured; a conical, awl-shaped gland between each pair; stipules long, awl-shaped, villous. *Flowers* in axillary racemes, shorter than the leaves. A native of South America, communicated to La Marck by Thouin. 24. *C. occidentalis*, Linn. Spec. Pl. 11. Mart. 12. Lam. 17. Willd. 16. (*C. americana* foetida, foliis oblongis, glabris; Tourn. 619. Paiomirioba 1. Pison. p. 185. Senna occidentalis; Comm. Hort. 1. p. 51. tab. 26. Sloan. Jam. hist. 2. p. 48. tab. 175. fig. 3, 4.) "Leaflets in five pairs, ovate-lanceolate, scabrous at the edges; outer ones larger, a gland at the base of the petioles." *Root* perennial, woody, fibrous, blackish, striking deep into the earth. *Stem* herbaceous, two or three feet high, greenish, rough with irregularly scattered dots, scored downwards from each petiole with two grooves. *Leaflets* acuminate, smooth, foetid, growing gradually larger to the upper ones; in old plants only three pairs. *Flowers* yellow, in loose terminal racemes. *Legumes* from four to six inches long, three lines broad, a little compressed, slightly curved in the same manner as that of *C. falcata*. A native of Jamaica, where it is called stinking weed. It is esteemed a powerful resolvent, and useful ingredient in baths and fomentations for inflammations of the limbs. 25. *C. planifiliqua*, Linn. Sp. Pl. 13. Mart. 13. Lam. 18. Willd. 17. (*C. filiquis planis*; Plum. Spec. 18. Burm. Amer. tab. 77.) "Leaflets in five pairs, ovate-lanceolate, smooth; a gland at the base of the petioles." A tree about the size of the common walnut tree. *Wood* firm, whitish; bark slightly wrinkled, dark brown. *Flowers* yellow, in terminal racemes. *Legumes* about a foot long, six or seven lines broad, compressed, a little curved, jointed. A native of Guadaloupe. 26. *C. fistula*, Linn. Sp. 14. Mart. 14. Lam. 19. Willd. 18. Rumph. Amb. 2. p. 83. tab. 21. Woodv. Med. Bot. tab. 163. Gært. tab. 147. fig. 1. (*C. fistula alexandrina*; Bauh. pin. 403. Tourn. 6, 9. Rai. hist. 1746. Cassia nigra; Dod. pempt. 787. Conna, Rheed. Mal. 1. p. 37. tab. 22.) "Leaflets in five pairs, egg-shaped, acuminate, smooth; petioles without glands." A tree forty or fifty feet high. *Trunk* large, much branched. *Leaves* from three to five inches long, near two broad, equal at the base, lower ones largest, finely nerved, with a prominent midrib underneath, alternate, petioled; stipules scarcely apparent. *Flowers* large, yellow, veined, growing about five and twenty together in axillary racemes; partial peduncles two inches long, calyx smooth, three times shorter than the corolla; anthers oval, divided into two lobes at their base; germ slender, cylindrical, curved into a semicircle. *Legumes* about two feet long, cylindrical, dark brown, woody, with a longitudinal seam on one side, divided by transverse partitions into numerous cells, each containing one seed lodged in a sweetish black pulp. A native of Egypt, and almost all the warmer parts of the East Indies; and now naturalized in the West Indies and

and South America. It is the cassia solutiva of the Arab and Greek physicians of the middle ages, and its pulp has been very generally employed as a mild laxative, seldom producing uneasiness in the bowels, and therefore peculiarly proper for children and delicate or pregnant women. Dr. Cullen is of opinion that it does not differ from other sweetish acid fruits, and that the pulp of prunes may be employed with equal effect. The pods of the East India cassia are of less diameter, smoother, and afford a blacker, sweeter, and more grateful pulp, than those which are brought from the West Indies, South America, or Egypt. The best pulp is of a bright shining black colour; and of a sweet taste, with a slight degree of acidity. It dissolves both in water and rectified spirit; readily in the former, slowly in the latter, and not totally in either: the residuum has little or no activity. See Woodv. Med. Bot. p. 449. The official electuary of cassia is directed to be prepared in the following manner: take of the fresh extracted pulp of cassia, half a pound; manna, two ounces by weight; tamarind, one ounce by weight; rose-syrup, half a pound. Beat the manna, and dissolve it, in a water-bath saturated with sea-salt, in the rose-syrup; then add the pulps; and with the same degree of heat, evaporate the whole to an electuary of proper consistence. The dose of cassia is from ʒss. to ʒi. Lond. Pharmac. 1796. 27. *C. patula*, Mart. 46. Willd. 19. Hort. Kew. 2. p. 51. "Leaflets in five pairs, oblong, somewhat acute, smooth; a gland at the base of the petioles; branches with an even surface." Root perennial. Leaflets sometimes in six pairs. It differs from *C. occidentalis* and *planifolia* in the leaflets not tapering to the extremity. A native of the West Indies, introduced into England in 1778. 28. *C. pilosa*, Linn. 12. Mart. 16. Lam. 21. Willd. 22. Swartz. Ob. 160. (*C. suffruticosa erecta hirsuta*; Brown Jam. 224.) "Leaflets in five pairs, without glands; stipules semicordate, acuminate; stem stiff, hairy." Stem somewhat shrubby, from one to two feet high, upright, reddish; branches short, nearly upright. Leaflets nearly sessile, oblong, rounded at the tip, sharp, with a very small bristle fixed obliquely to the petiole, veined, a little hirsute at the edges; common petioles thicker at the base, round, hirsute; glands extremely minute, concealed in the hairs under the lowest pair of leaflets. Flowers yellow, axillary, two or three together, small; peduncles one-flowered; petals nearly equal, with claws, concave. Bractes two, whitish. Legumes nearly cylindrical, linear, pubescent. A native of Jamaica. 29. *C. lineata*, Mart. 50. Willd. 20. Swartz. Prod. 66. Fl. Ind. Occ. 2. p. 726. "Leaflets in five pairs, somewhat oblong, pubescent underneath, nearly equal; an obsolete gland under the lower pair; peduncles one-flowered." Root perennial. Stem more shrubby and rigid, with less hairy branches, than the preceding species. Peduncles and stipules short. Legumes linear. 30. *C. atomaria*, Linn. Mant. 68. Mart. 15. Lam. 20. Willd. 21. "Leaflets in five pairs, egg-shaped, somewhat tomentous; petioles round, without glands." Stem the height of a man, woody, ash-coloured, much branched; little branches and petioles scarcely sensibly pubescent; petioles cylindrical, not channelled, besprinkled with small rust-coloured points. Leaflets green on both sides, pubescent to the touch; lower ones not smaller, more obtuse, somewhat emarginate, equal at the base; stipules awl-shaped, often permanent. 31. *C. frutescens*, Mart. 43. Mill. Dict. 2. Houft. MSS. "Leaflets in five pairs, egg-shaped, smooth; outer ones longer; stem shrubby." Stem five or six feet high, much branched towards the top. Flowers yellow, in loose racemes, lateral and terminal. Legumes long, taper. Seeds in a double row. 32. *C. arborescens*, Willd. 40. not of Miller. See n. 5. Vahl. Symb. 3. p. 56. (*C. glauca*,

Lam. *Wellia tagera* Rheed. Mal. 6. p. 17. tab. 9, 10. "Leaflets in about five pairs, elliptical, smooth; an oblong gland between the lowest; stipules awl-shaped, curved; racemes axillary." "Leaflets in six pairs, egg-shaped, glaucous and veined underneath; glands oblong, several; legumes linear, straight, compressed, mucronate." Lam. A shrub five or six feet high. Branches pubescent at their summit. Leaflets two inches and a half long, more than one broad, a gland between each pair. Flowers yellow in axillary racemes at the summits of the branches. Legumes four or five inches long. Lam. A native of the East Indies. As both Willdenow and La Marek refer to *Wellia-tagera* of Rheed, we have put their species together; although we do not see how a shrub only six feet high can with any propriety be called *arborescens*. La Marek's description was formed from specimens in flower and young fruit sent by Sonnerat. 33. *C. Senna*, Linn. Sp. Pl. 9. Mart. 17. Willd. 24. (*C. lanceolata*, Lam. 22. Forsk. Egypt. 85. n. 58. *Senna officinalis*; Gært. *Senna alexandrina*; Bauh. pin. 397. Tourn. 6, 8. Rai. hist. 1742. Morif. § 2. tab. 24. fig. 1. *Senna orientalis*; Tabern. ic. 517.) "Leaflets in five pairs, lanceolate, equal; a gland above the base of the petioles." Lam. from Forsk. Stems from two to three feet high, somewhat woody; branches slender. Leaves alternate; leaflets an inch long, lively green, smooth, on short petioles. Flowers pale yellow, in terminal racemes, on long peduncles. Legumes oblong, recurved, compressed. Lam. Legumes ovate-kidney-shaped, membranous, compressed, with foliaceous appendages, protuberant at the seat of the seeds; marked by capillary, transverse, parallel striæ; from six to nine-celled, two-valved; partitions transverse, very thin. Gært. A native of Arabia and Upper Egypt, whence the leaves are brought to Grand Cairo; and as Alexandria is the port from which it is shipped for Europe, it has obtained the name of Alexandrian senna or fenna. The leaves of senna, as they are imported for medicinal use, have a rather disagreeable smell and a somewhat acrid, bitterish, nauseous taste; they give out their virtue both to watery and spirituous menstrua, communicating to water and proof spirit a brownish colour, more or less deep according to the proportions, to rectified spirit a fine green. As far as is now known, it was first introduced as a purgative by the Arabian physicians Serapion and Mesue, who flourished about the beginning of the ninth century. The first of the Greeks by whom it is noticed is Actuarius in the thirteenth. Actuarius, however, speaks not of the leaves but the fruit. Mesue likewise seems to prefer the pod, as more efficacious than the leaf. In fact the pod purges less powerfully than the leaves, but has the advantage of not griping the bowels, like the leaves, and of being without their nauseous bitterness. For covering the taste of senna, Dr. Cullen recommends coriander seeds; and for preventing its griping, the warmer aromatics, as cardamoms or ginger. The formulæ of senna given by the colleges, are those of an infusion, a powder, a tincture, and an electuary. See Woodville's Medical Botany.

The London Pharmacopœia, 1796, directs the simple infusion of fenna to be prepared by macerating 1½ oz. by weight of fenna, 1 dram of powdered ginger by weight, and one pint of boiling distilled water, for one hour, in a covered vessel, and straining the liquor, when cold. For the tartarised infusion of fenna, take of fenna 1½ oz. by weight, bruised coriander ½ an ounce by weight, crystals of tartar 2 drams by weight, and one pint of distilled water. Boil the crystals of tartar in the water, until they are dissolved; then pour the water, yet boiling, upon the fenna and seeds; macerate for an hour in a covered vessel,

fel, and strain when cold. Both the preceding infusions are mildly purgative to adults in the dose of an ounce and an half, or two ounces; the nauseous flavour of the fenna is more covered in the latter; and perhaps would be still more so by the addition of sugar.

For the compound powder of fenna, take fenna and crytals of tartar of each 2 ounces by weight, scammony, $\frac{1}{2}$ an ounce by weight, and ginger 2 drams by weight; rub the scammony separately, and the rest together, into powder, and then mix them.

For the tincture, take of fenna 1lb., carraway bruised $1\frac{1}{2}$ oz. by weight, lesser cardamoms bruised $\frac{1}{2}$ an oz. by weight, raisins stoned, 16 oz. by weight, and proof-spirit of wine, one gallon. Digest for 14 days, and strain.

For the extract, take of fenna 1lb., and distilled water, one gallon. Boil the fenna in the distilled water, adding, after its decoction, a little rectified spirit of wine. Evaporate the strained liquor to a proper consistence. The spirit may be added when the decoction is reduced to one half, or to 3 pints. The extract is given as a gentle purgative, from 10 grains to a scruple; or, in less quantity, as an assistant to the milder laxatives.

34. *C. Italica*, (c. fenna, Lam. 23. c. fenna β . Linn. Senna Italica, Bauh. pin. p. 397. Tourn. p. 618. Rai. hist. 1742. Senna Dod. pempt. 361. Lob. ic. 2. p. 88. Burm. Ind. tab. 33. fig. 2.) "Leaflets in six pairs, inversely egg-shaped; petioles without glands." Root annual. Stem a foot and half high, but little branched. Leaves alternate; leaflets green above, rather glaucous and slightly pubescent underneath, unequal at their base, larger than those of the preceding species, from which they are also decisively distinguished by the obtuseness of their summit. Flowers pale yellow, with purple veins, in terminal and axillary racemes; peduncles long; calyx-leaves reflexed. Legumes oval-oblong, compressed, curved upwards. Supposed to be a native of the northern part of Africa, and the Levant. It is cultivated on a large scale in Italy for medical purposes, and has been naturalized in the West Indies, where it is applied to the same use. It possesses the same qualities as *C. lanceolata*, but is less powerful, and requires to be taken in larger doses. La Marck has followed Forskal in considering the two kinds as specifically distinct, but has perversely given fenna as a trivial name, to the variety β . of Linnaeus, at the same time that he maintains, the other plant to be the real fenna of Alexandria. 35. *C. ruscifolia*, Mart. 19. Willd. 25. Jac. ic. rar. 1. tab. 71. Collect. 1. p. 43. "Leaflets in six pairs, lanceolate, acute, smooth; a gland above the base of the rib; peduncles many-flowered." A shrub about the height of a man. Stem erect, round. Leaflets on short petioles, upper ones gradually larger. Flowers yellow, in solitary axillary racemes near the ends of the branches. Legume straight, a little compressed, smooth, ending in a blunt roundish beak, about four inches long. Seeds ovate, shining, black, a little compressed, with scarcely any pulp. A native of the Island of Madeira. 36. *C. biflora*, Linn. Sp. Pl. 15. Mart. 18. Lam. 24. Willd. 26. Bot. mag. 810. (not of Miller, see n. 19.) *C. fruticosa* foliis minoribus, floribus geminis, &c. Brown. Jam. 223. *C. minor* frutescens; Plum. spec. 18. ic. 78. fig. 1. Burm. Am. 78. fig. 1.) "Leaflets in six pairs, rather oblong, smooth; lower ones smaller; an awl-shaped gland between the lowest; pedicels generally two-flowered." A small shrub. Branches numerous, slender, quite smooth, growing near together. Leaflets obtuse, with a very small brittle-shaped point, the largest not more than an inch long. Flowers yellow, in loose axillary racemes.

Legumes straight, linear, compressed, blackish, three or four inches long. A native of the West Indies. 37. *C. Chinenfis*, Willd. 27. (not of La Marck, see n. 22.) Jacq. ic. rar. 1. tab. 73. Collect. 1. p. 64. "Leaflets in about six pairs, egg-shaped, acute, smooth; a gland at the base of the petiole; legume cylindrical, uncinat, transversely ribbed." A native of China about Pekin. 38. *C. multiglandulosa*, Mart. 21. Willd. 28. Jacq. ic. rar. 1. tab. 72. Collect. 1. p. 42. "Leaflets in about six pairs, oval-oblong, obtuse, hairy, outer ones larger; an awl-shaped gland between each pair; legumes linear." A shrub about the height of a man. Young branches, petioles, peduncles, under surface and edges of the leaves villous. Leaflets on very short peduncles, blunt, with a small point. Flowers yellow, in terminal racemes; calyx-leaves villous, concave, yellow, very blunt, spreading, unequal; petals blunt, almost twice as large as the calyx; three upper ones very large. Legume linear, brownish ash-colour, slightly villous and soft to the touch, blunt, swollen with the seeds, about three inches long. Seeds somewhat egg-shaped, blunt, scarcely compressed, black, shining, without pulp. Hort. Kew. Found by Masson in the gardens of Teneriffe and introduced by him into England in 1779. 39. *C. hirsuta*, Linn. Sp. Pl. 16. Mart. 20. Lam. 25. Willd. 29. (*C. americana* foetida, foliis amplioribus villosis, Tourn. Inst. 619.) "Leaves in six pairs, broadly egg-shaped, acuminate, woolly." Nearly allied to *C. occidentalis*, and differing from it chiefly in its woollyness. 40. *C. tomentosa*, Linn. jun. supp. 231. Mart. 22. Willd. 30. Lam. 29? "Leaflets in six to eight pairs, obliquely rounded at the base, hairy above; panicles axillary; legumes villous." Linn. jun. "Leaflets in six to eight pairs, oblong-egg-shaped, mucronate, tomentous underneath; awl-shaped glands several; racemes axillary; legumes tomentous." Lam. A tree. Branches woody, round, zigzag; clothed with a dense, soft, white down, which becomes yellow when dry. Leaflets linear-lanceolate, acute, quite entire, green above, white or yellow underneath, tomentous. Stipules semilunar or lanceolate, tomentous, deciduous. Flowers yellow. Legumes straight, compressed, very tomentous. A native of South America. Mutis. La Marck's plant was found in Brazil by Commerçon, and described by him from a living one in the royal garden at Paris. It appears to differ from that of Mutis only in the form of the leaflets. 41. *C. serpens*, Linn. Sp. Pl. 17. Mart. 23. Lam. 26. Willd. 31. Swartz obs. 161. Brown Jam. 225. n. 15. Sloane Jam. 2. 5. "Leaflets in seven pairs; flowers pentandrous; stems filiform, prostrate, herbaceous." Root annual. Stems three or four inches long, generally simple, stiff, round, villous. Leaflets somewhat sickle-shaped, sessile, approximating, flat, oblique, terminated by a short bristle, somewhat villous; common petioles short, hirsute; glands two, red, flat, sessile, roundish, perforated, situated beneath the lowest pair of leaflets. Stipules two, opposite, oblique, lanceolate, acuminate. Flowers yellow, not axillary, but crowded above the petioles, on very short peduncles; calyx-leaves lanceolate, spreading; petals unequal, egg-shaped, obtuse, concave, spreading; filaments short; anthers linear, fertile; the three anterior ones bent down and somewhat larger, germ compressed, oblong; style thickish; stigma blunt, pubescent. Legume flat, compressed, of a broad linear shape, margined, blunt, villous, many-seeded. A native of Jamaica, in pastures, creeping among the grass. Swartz. 42. *C. mexicana*, Willd. 32. Jacq. hort. Schæn. 2. p. 41. tab. 23. "Leaflets in seven pairs, rather obtuse, pubescent, ciliated; a cylindrical gland between the lowest." A native of Mexico.

43. *C. angustifolia*, Willd. 33. Vahl. Symb. 1. p. 29. "Leaflets in seven pairs, lanceolate; outer ones larger; petioles without glands; stem shrubby." It differs from *C. fenna* in the number and form of the leaflets, and in the mature legumes not being curved inward; from *C. ligustrina* in its larger outer leaflets, and petioles without glands. Vahl. 44. *C. ligustrina*, Linn. Sp. Pl. 18. Mart. 24. Lam. 27. Willd. 34. (*Senna ligustri folio*, Plum. spec. 18. Tourn. 619. Dill. Elth. 350. tab. 259. fig. 338. *Cassia Bahamensis* Mart. Cent. tab. 21.) "Leaflets in seven pairs, lanceolate; outer ones smaller; a gland at the base of the petioles." A shrub six or seven feet high, the thickness of the little finger, slightly angular; branches numerous, deeply striated axils, upper part of the stem, edges, and back of the leaves finely pubescent. *Flowers* yellow, in axillary racemes near the top of the stem, peduncled. *Legumes* two inches long or more, one inch broad, oblong, compressed, a little curved upwards. A native of Martinico, the Bahama isles and Virginia. 45. *C. florida*, Willd. 35. Vahl. Symb. 3. p. 57. "Leaflets in seven pairs, oval-oblong, smooth, emarginate, without glands; flowers in racemes; bractes spatula-shaped, mucronate. A native of the East Indies. 46. *C. stipulacea*, Willd. 36. Mart. 47. Hort. Kew. 2. p. 52. Feuill. peruv. 3. p. 56. tab. 42. "Leaves in about eight pairs, ovate-lanceolate; a gland between the lowest pair; stipules ovate, very large." A native of Chili introduced by Thouin in 1786. 47. *C. alata*, Linn. Sp. Pl. 19. Mart. 25. Lam. 30. Willd. 37. Swartz observ. 162. (Herpetica, Rumph. amb. 7. p. 35. tab. 58. C. herpetica, Jacq. obs. 2. p. 24. tab. 45. fig. 2. Plum. spec. 18. Sloane Jam. hist. 2. p. 59. tab. 175. fig. 2. C. bracteata, Linn. jun. Sup.?) "Leaflets in eight pairs, oval-oblong; inner ones smaller; petioles without glands; stipules spreading." Linn. "Leaflets in eight pairs, oval-oblong, obtuse, mucronate; petioles without glands; legumes with two wings." Lam. Stems several, somewhat woody, from six to nine feet high, about the thickness of a finger, cylindrical, smooth, a little twisted, and branched towards the top. *Leaves* alternate, from a foot to a foot and a half long; leaflets near two inches and a half long, one inch broad, near together, quite smooth. *Flowers* yellow, in terminal racemes; bractes roundish-ovate, concave, entire, the colour of the flowers, loosely imbricate, resembling scales; calyx-leaves oblong, concave, coloured, tender; petals unequal, roundish, with claws, concave, entire; the fifth a little larger, waved with a fringed border. *Legumes* five or six inches long, quadrangular; opposite angles winged; margin crenate. *Seeds* separated by alternate, membranous partitions, rhomboidal, compressed. Mill. and Lam. The juice of the leaves or buds is said to cure the ringworm. A native of the East and West Indies. 48. *C. marilandica*, Linn. Sp. Pl. 20. Mart. 26. Lam. 31. Willd. 38. Dill. Elth. 351. tab. 260. fig. 339. Mart. Cent. tab. 23. "Leaflets in eight pairs, ovate-oblong, equal; a gland at the base of the petioles." Root perennial. Stems several, three or four feet high, often simple, herbaceous, cylindrical, either entirely smooth, or furnished with a few hairs. *Leaves* alternate, rather long, green above, and pale underneath. *Flowers* bright yellow, in short axillary racemes on the upper part of the stem. *Legumes* three or four inches long, a little curved, mucronate, bordered with conspicuous joints, and a few scattered reddish hairs. A native of Maryland and Virginia. 49. *C. surattensis*, Lam. 32. Burm. Fl. Ind. 97. "Leaflets in eight pairs, ovate-oblong, obtuse, emarginate; lower ones smaller; a pedicelled gland at the base of the lowest pair." Stem herbaceous. *Stipules* two, linear-lanceolate, at the base of each petiole. *Flowers* large, orange; peduncles axillary; bractes

heart-shaped, acute. A native of the neighbourhood of Surat. 50. *C. fastigiata*, Willd. 39. Vahl. Symb. 3. p. 57. "Leaves in nine pairs, oblong, smooth; a pedicelled gland between every pair of leaflets; flowers in racemes." Root perennial. A native of the East Indies. 51. *C. frondosa*, Mart. 48. Willd. 40. Hort. Kew. 2. p. 35. (*C. cristata*, Jacq. Ic. Rar. 1. tab. 74. Collect. 1. p. 83.) "Leaflets in nine pairs, oval-oblong, smooth, rather obtuse, a cylindrical gland between the lowest; petiole without any gland at the base." Root perennial. 52. *C. tenuissima*, Linn. Sp. Pl. 21. Mart. 27. Lam. 33. Willd. 41. Roy. Lugd. 478. "Leaflets in nine pairs, oblong; an awl-shaped gland between the lowest." Root perennial. A native of the Havanna. La Mark observes that he has seen in the Herbarium of Jussieu a plant under this name, resembling *C. chamæcrista*, but with only nine pairs of leaflets. The peduncles are axillary, one-flowered, shorter than the leaves; the calyx-leaves very acute, and as long as the petals. 53. *C. siamea*, Lam. 34. "Leaflets in eight or nine pairs, ovate-oblong, obtuse, smooth; petioles without glands; corymbs peduncled, axillary, and terminal. A tree. *Leaflets* almost emarginate, coriaceous, on short petioles. *Legumes* six or seven inches long, flat, bordered. According to Commerçon, it is cultivated in the island of Ceylon for the beauty of its flowers. 54. *C. virgata*, Mart. 51. Willd. 42. Swartz Prod. 66. Fl. Ind. Occid. 2. p. 728. "Leaflets in ten pairs, ovate-lanceolate, villous; a petiolar pedicelled gland; peduncles one-flowered, longer than the leaflets." A native of Jamaica and Hispaniola. Nearly allied to *C. chamæcrista*, but differs in having a shrubby branched stem; rigid, somewhat zigzag, erect branches; and narrower, more acute leaflets. 54. *C. fophera*, Linn. Sp. Pl. 22. Mart. 28. Lam. 35. Willd. 43. Lour. Cochinc. 264. (*Senna*, Burm. Zeyl. 213. tab. 98.) *Galega affinis*, Bauh. Pin. 352. *Gallinaria acutifolia*, Rumph. Amb. 5. p. 283. tab. 97. fig. 1. Ponnam-Tagera, Rheed. Mal. 2. p. 101. tab. 52. "Leaflets in ten pairs, lanceolate; an oblong gland at the base." A shrub, from three to five feet high; branches cylindrical, smooth. *Leaves* an inch and half long; leaflets slightly villous at their edges. *Flowers* pale yellow, veined, in short axillary racemes or corymbs. *Legumes* three inches and a half long, two lines broad, compressed, linear, mucronate, nearly smooth, somewhat resembling those of *C. occidentalis*. A native of the East Indies, China, and the island of Tongatabu in the South Seas. 56. *C. angustifolia*, Lam. 36. Plum. Spec. 18. Burm. Amer. tab. 78. fig. 2. "Leaflets in ten pairs, ovate-oblong, acute, awned; a pedicelled gland between the lowest; legumes narrow, compressed." A shrub. *Leaflets* smooth above, a little villous underneath. *Flowers* yellow, large, in compound, terminal, and axillary racemes. *Legumes* from three to five inches long, blackish, straight. A native of the island of St. Domingo. 57. *C. auriculata*, Linn. Sp. Pl. 23. Mart. 30. Lam. 37. Willd. 45. (*Senna spuria*, Pluk. Alm. 341. tab. 314. fig. 4.) "Leaflets in twelve pairs, obtuse, mucronate; glands several, awl-shaped; stipules kidney-shaped, bearded. A shrub. *Branches* ligneous, a little pubescent towards their summit. *Leaflets* oval-oblong, somewhat villous underneath; stipules large, embracing the stem, very obtuse, with one particular bristle on each side. *Flowers* orange, very large, growing from three to five together, in short terminal bunches. *Legumes* compressed, slender, almost smooth, narrowed at the base, obtuse, terminated by a thread shaped point. A native of the East Indies. 58. *C. brevifolia*, Lam. 48. Willd. 46. "Stem much branched, nearly smooth; leaflets in twelve pairs, inversely egg-shaped; peduncles lateral, one-flowered, longer than the leaves." Stem woody, from three to five inches long; branches very

slender. *Leaves* five or six lines long; leaflets very small, growing near together. *Legumes* an inch long, compressed, almost smooth. A native of the island of Madagascar. 59. *C. javanica*, Linn. Sp. Pl. 24. Mart. 31. Lam. 38. Willd. 48. Vahl. Symb. 3. p. 58. (*C. fistula javanica*, Comm. Hort. 1. p. 217. tab. 111. *C. fistula sylvestris*, Rumph. Amb. 2. p. 88. tab. 22.) "Leaflets in twelve pairs, oblong, obtuse, smooth; gland none." Linn. "Leaflets from twelve to fifteen pairs, egg-shaped, obtuse, smooth; legumes nearly cylindrical, very smooth." Lam. A lofty tree. *Flowers* red or yellowish, in short racemes. *Legumes* longer and more slender than those of *C. fistula*, divided into numerous cells by transverse partitions, without any succulent pulp. A native of Java and the Molucca islands. 60. *C. brasiliensis*, Lam. 39. (*C. grandis*, Linn. jun. and Willd. excluding the synonym. *C. mollis*, Vahl. ? *C. fistula flore incarnato*, Breyn. Cent. 1. p. 58. tab. 21. *C. fistula brasiliensis*, Bauh. Pin. 403. Tourn. 619. Rai. Hist. 1747.) "Leaflets from fifteen to twenty pairs; leaflets oblong, obtuse, pubescent; legumes very large, thick, compressed, sword-shaped." Lam. A large tree. *Branches* extending widely on every side; little branches covered with a fine down. *Leaves* large; leaflets near together; common petiole nine or ten inches long, without any gland. *Flowers* flesh-coloured, in simple axillary racemes, shorter than the leaves. *Legumes* a foot and half or two feet long, at least three inches broad; with one suture double, the other single, in some degree resembling a fabre; many-celled, containing a brown or blackish pulp, similar to that of *C. fistula*, but bitter and disagreeable. A native of Brasil and Surinam. 61. *C. nigricans*, Willd. 50. Vahl. Symb. 1. p. 30. (*C. procumbens*, Forsk. Arab. p. 111.) "Leaflets in twelve pairs, linear-oblong, very obtuse, mucronate; a sessile gland at the base." Perennial. A native of Arabia Felix. 62. *C. polyphylla*, Willd. 51. Jacq. Ic. Rar. 3. tab. 460. Collect. 4. p. 104. "Leaflets in many pairs, elliptical, obtuse, ciliated; an oblong, sessile gland between the lowest; peduncles often two-flowered." A native of the island of Porto Rico. Perennial. 63. *C. Chamæcrisla*, Linn. Sp. Pl. 25. Mart. 33. Lam. 40. Willd. 52. Bot. Mag. 107. (*C. suffruticosa erecta*, &c. Brown Jam. 225. *Chamæcrisla pavonis major*, Commel. Hort. 1. p. 53. tab. 37.) "Leaflets in many pairs; a petiolar pedicelled gland; stipules sword-shaped." Root annual. *Stem* a foot and half high, cylindrical, pubescent, branched from the bottom. *Flowers* yellowish; the two upper petals with a purple spot; peduncles axillary, solitary, or sometimes two together, one-flowered, shorter than the leaves. A native of Jamaica, Barbadoes, and Virginia. 64. *C. glandulosa*, Linn. Sp. Pl. 26. Mart. 34. Lam. 41. Willd. 53. (*Chamæcrisla pavonis americana*, Breyn. Cent. 66. tab. 24. ?) "Leaflets in many pairs, with many glands; stipules awl-shaped." *Stems* a foot high, slender, somewhat shrubby. *Leaflets* lanceolate. *Flowers* hexandrous; two of the anthers very long; peduncles axillary, in pairs, one-flowered, shorter than the leaf. 65. *C. mimoides*, Linn. Sp. Pl. 42. Mart. 35. Lam. 42. Willd. 54. "Leaflets in many pairs, linear: an obsolete gland at the base of the petioles; stipules bristle-shaped." *Stem* two feet high, erect, simple, cylindrical; peduncles axillary, as long as the leaves, in pairs, one-flowered, furnished a little below the flower with two small, lanceolate, acute bristles. *Legumes* linear. A native of the island of Ceylon. 66. *C. microphylla*, Willd. 55. "Leaflets in many pairs, linear, mucronate; a gland between the lowest; stipules lanceolate, mucronate; peduncles solitary, one-flowered; stem with rod-like branches. *Stem* pubescent. *Legume* compressed, linear, clothed with a fine down. Nearly allied to the preceding, but thought by Vahl to be distinct. A

native of the island of St. Crux. 67. *C. flexuosa*, Linn. Sp. Pl. 28. Mart. 36. Lam. 43. Willd. 56. (*Chamæcrisla*, Breyn. Cent. 64. tab. 23.) "Leaflets in many pairs; stipules half heart-shaped. *Root* annual. *Stem* slender, a little angular, zigzag. *Leaves* long, narrow; leaflets linear-lanceolate, three-nerved, pale green, crowded; stipules large, acute, nerved. *Peduncles* solitary, axillary, one-flowered. A native of Brasil. 68. *C. angustissima*, Lam. 44. "Leaflets in many pairs, very small, awned; stipules lanceolate-bristle-shaped; peduncles in pairs, or two-cleft; stem hairy." *Root* annual. *Stem* slender, cylindrical, villous, a little branched, not zigzag. *Leaves* long, very narrow, villous; leaflets linear, crowded. *Peduncles* lateral, a little above the axils of the leaves. *Legumes* linear, compressed. Observed in the island of Java by Commerfon. 69. *C. capensis*, Willd. 57. Thunb. Prod. 79. "Leaflets in many pairs, linear; stem erect, zigzag, villous." A native of the Cape of Good Hope. 70. *C. nicotiana*, Linn. Sp. Pl. 29. Mart. 37. Lam. 45. Willd. 58. Hort. Clif. 497. tab. 36. (*Senna spuria virginica*, Pluk. Alm. 341. tab. 314. fig. 5. *Arrana mæsta*, Rumph. Amb. 6. p. 147. tab. 161. fig. 1.) "Leaflets in many pairs; flowers pentandrous; stem rather erect." *Root* annual. *Stem* from eight to ten inches high, slender, slightly villous, a little branched. *Leaflets* in twelve to fifteen pairs, oblong, obtuse, with a bristle-shaped point, crowded; with a brown, pedicelled gland a little below the lowest pair. *Flowers* pale yellow, small, axillary, solitary, on very short peduncles; the lower petal larger and more open than the others. A native of Virginia. 71. *C. procumbens*, Linn. Sp. Pl. 30. Mart. 38. Lam. 46. Willd. 59. (*C. americana procumbens*, Comm. Petrop. tab. 11.) "Leaflets in many pairs, without glands; stem procumbent." *Root* annual. *Stem* herbaceous. *Flowers* small. *Legumes* narrow, compressed. A native of Virginia. 72. *C. pumila*, Lam. 47. (*Mimosa pumila*, Pluk. 252. tab. 120. fig. 1.) "Stem hairy, much branched; leaflets in many pairs, ciliated at the base; a petiolar pedicelled gland; flowers very small." *Stem* divided from its base into many slender branches, three or four inches long, spreading on the ground. *Leaflets* oblong, acute, villous underneath, crowded. *Flowers* axillary, generally in pairs, on very short peduncles. *Legumes* near an inch long, somewhat villous. A native of China and the East Indies.

Propagation and Culture. Some species of *Cassia* are cultivated for their beauty, and others for their rarity. They are all propagated by seeds, but as they are natives of warm climates, they must be raised in hot-beds. Such as grow naturally between the Tropics, require the protection of a stove; and few will endure the rigour of our winters in the open air. The seeds of *Cassia fistula* may be procured from the druggists, who import the pods for official purposes.

CASSIA cinnamomea, Herm. Lugd. See *LAURUS cinnamomum*.

CASSIA malabarica, Herm. Lugd.—*Lignea*, Black.—*cinnamomea*, Pluk. Alm. 88, 89. See *LAURUS cassia*.

CASSIA lignea jamaicensis & *cinnamomea barbadensium*, Pluk. Alm. See *CANELLA alba*.

CASSIA, in *Geography*, a country of Sumatra, the inhabitants of which live in villages, independent of one another, and are always at war. See *SUMATRA*.

CASSIA stake, in the *Glass Trade*, is that iron with a piece of wood placed on it, on which they lay the glass after they have taken it off the pipes, and on which they turn the glass, to fasten the pontee to it.

CASSIAN, JOHN, in *Biography*, an ecclesiastical writer of the class of monks, was most probably born in Scythia, though others say that he was a native of France, and others of

of Africa. He was brought up in the monastery of Bethlehem, where he formed an intimacy with a monk named Germanus; and from whence they went together into Palestine and Egypt, and passed seven years with the solitaries of the Thebais. The theological disputes that prevailed even in these deserts, occasioned their withdrawing to Constantinople, where Cassian was ordained deacon by St. Chrysostom. Upon the expulsion of this prelate from his see, he was deputed, together with Germanus, in 403, to lay the complaints of the church before pope Innocent I., by whom he was ordained priest. When Rome was taken by Alaric, he removed to Provence, and in 410 fixed at Marseilles. Here he founded two monasteries, one for each sex, and inculcated in Gaul, both by his discourse and writings, the opinions of the Semipelagians on the doctrine of grace, together with the rules of discipline which were observed among the Syrian and Egyptian monks; and here he is supposed to have died, between the years 430 and 433. His works, some of which detailed the mode of living among the Egyptian monks, and the discourses of their most famous abbots, were published in folio at Frankfort, in 1722, with a large commentary by Alardus Gazæus. Cassian has been regarded as a saint by several popes; and though he was never canonized by the church, his memory has been so much revered in Provence, that a day was observed as his festival; and his works were held in very high estimation by the devotees of the church of Rome. Du Pin. Eccl. Hist. 5th century, vol. ii. Mosheim, E. H. vol. ii.

CASSIANI, a sect in *Civil Law*, who adhered to the system and interpretations of Cassius, a celebrated lawyer, in opposition to those of Pegasus, a timid slave of Domitian, who derived his name from the galley which his father commanded, whose adherents were denominated Pegasiani. These parties were also denominated Sabinians and Proculians. See CAPITO. The popular cause was in the hands of Pegasus, while the favourite of the Cæsars was represented by Cassius, who gloried in his descent from the patriot Cæcilius. Tacit. Annal. xvii. 7. Sueton. in Nerone, c. 37.

CASSIANISM, from *Cassian*, a teacher in Gaul to those who were called Semipelagians towards the close of the fifth century, is sometimes used for Semipelagianism. See CASSIAN.

CASSICAN, in *Ornithology*, cassin de la nouvelle Guinée, Buffon: the pied roller of Latham, *CORACIAS varia*, which see.

CASSICUS. Brisson calls the oriolus Persicus by this name, *cassicus luteus*. See ORIOLOUS *Persicus*.

CASSIDA, in *Botany*, Tourn. Hall. Ray. Petiv. See SCUTELLARIA.

CASSIDA, in *Entomology*, a genus of coleopterous insects, which, according to Linnæus, have moniliform antennæ that become rather thicker towards the end: thorax and wing-cases with a broad margin, the former flat, and forming a kind of shield, beneath which the head is concealed. To this Mr. Marsham adds, that the body is oval, convex, and flat beneath. Marsh. Ent. Brit. The Fabrician character as usual is taken principally from the parts and structure of the mouth: he observes that the anterior feelers are clavated, and those behind filiform; lip elongated and entire, and the antennæ moniliform.

The above are the essential characters of this genus, to which a few general particulars may be added. The rotundate figure of the body, gibbous back, and flattened surface beneath are a strong criterion of this genus. The surface above is commonly smooth, and in some species glossy; eyes oval, and placed near each other; antennæ inserted between the eyes; scutel triangular and small; wing-cases

same length as the abdomen; legs short, thighs compressed, shanks rounded, and the tarsi consisting of four joints. Many of the species are very beautiful when alive, some of which retain their brilliancy of colours in the height of perfection after death; in others, however, and those especially of a small size, these are altogether evanescent, their rich metallic or golden hues fading as the insect dies, and totally disappearing in the dried specimens. Cassidæ immersed in spirit of wine alive, are observed to retain the splendour of those golden hues for years in as high perfection as they appear in the living insect: but if taken out and allowed to dry, these change colour in the same manner as the insect would in dying without being steeped in spirits. For immediate observation, the true colours of the living insect may however be revived in the dried specimens at any time by leaving them for the space of fifteen or twenty minutes in warm water; the colours re-appearing while the insect is kept moist, and fading again as the insect dries.

The larvæ of the cassidæ are commonly found concealed on the under surface of the leaves of the plants on which they feed, and often hide themselves under a cover of their own excrements, which they support in the air above their bodies by means of their lateral spines, and the bristles at the extremity of their tail to shelter themselves from the sun and rain. The larvæ cast their skins several times before they pass into the pupa state. The perfect female insect deposits the eggs in regular order on the leaves of plants, and covers them with excrements to conceal them. The common English name of the insects of this tribe is the tortoise beetle. We have only an inconsiderable number of the species indigenous to this country, and those only of a small size; many of the larger kinds, and those distinguished for their vivid hues and colours are natives of South America. The following species are described by authors.

VIRIDIS. Green sprinkled with confluent dots. Marsh. Ent. Brit. *Cassida viridis*. Linn. La casside verte of Geoffroy. Frequent on thistles in Europe. Length one third of an inch.

CRUENTATA. Green, with a sanguineous dot near the base of the wing-cases. Inhabits Europe. Donov. Brit. Inf. *Cassida sanguinolenta* of Paykull.

SIMILIS. Green; wing-cases striate with dots. Found on anthemide cotula. Marsh.

Obs. Perhaps *cassida prasina* of Herbst. Inhabits Europe.

SPERGULÆ. Pale green; shield smooth; wing-cases striate with impressed dots. Discovered by Mr. Kirby. Marsh. Ent. Brit.

MURRÆÆ. Black; shield red; wing-cases sanguineous, sprinkled with black dots; named by Fabricius after Murray. Size of *cassida viridis*, and inhabits Europe.

LIRIOPHORA. Black, above green; thorax emarginate; suture and two dots on the shells black.

EQUESTRIIS. Green; a silvery streak at the top of the wing-cases; abdomen black, with a pale border. Olivier. A native of Germany: found on the water mint.

NEBULOSA. Pale clouded and dotted with brown. Linn. Found on thistles in Europe.

MACULATA. Greenish, with numerous black spots on the dorsal suture of the wing-cases. Donov. Brit. Inf.

NOBILIS. Greenish-grey, with a shining blue line on the wing-cases. Found principally on thistles, and inhabits Europe. Donov. Inf. &c.

SPLENDIDULA. Grey, with a coppery gold line, and streak in the middle of the wing-cases near the apex. A new British species allied to *cassida nobilis*. Marsh. Ent. Brit.

ATRATA. Deep black; anterior part of the shield sanguineous. Inhabits Germany. Fabr.

AFFINIS. Wing-cafes grey, dotted with black; thorax yellowish, and without spots. Inhabits Europe. Olivier.

AUSTRIACA. Thorax and wing-cafes dusky, dotted with black; margin rufous and immaculate. A native of Austria.

CRIERARIA. Reddish; thorax with four black dots; those on the wing-cafes numerous; shield emarginate. Inhabits America. Olivier.

DEUSTA. Reddish; numerous blue black dots on the wing-cafes, and two on the thorax; shield entire. A native of New Holland. Olivier.

OCTO-PUNCTATA. Reddish; thorax with two blue black dots; wing-cafes with four on each. Inhabits Siam. Fabr.

INTERRUPTA. Yellowish; thorax immaculate; wing-cafes with a broad black interrupted line. Inhabits New Holland. Fabr.

ST. CRUCIS. Testaceous; wing-cafes golden with three tubercles at the base; margin pale, with two black bands beneath.

SEX-PUNCTATA. Yellowish; disk of the wing-cafes ferruginous, with six black dots. Inhabits Cayenne. Fabr.

ANNULUS. Yellowish; disk of the wing-cafes black, with two yellowish rings, and posterior band. Inhabits Cayenne. Fabr.

JUDAICA. Ferruginous; disk of the wing-cafes marked with impressed dots, and spots of black. Found in South America. Fabr.

HEBRAEA. Pale, with numerous small black lines. Inhabits Cayenne.

CINCTA. Thorax and wing-cafes dusky, with yellowish margin; wing-cafes with a white hyaline spot before the edge. Inhabits Africa.

MARGINELLA. Green; margin of the thorax and wing-cafes yellow. A native of Brazil.

LIMBATA. Head, thorax, and wing-cafes dusky, with reddish margins. Found in Germany. Olivier.

FERRUGINEA. Black; thorax and wing-cafes ferruginous and immaculate. Fabr. *Cassida subferruginea* of Schrank. Smaller than *cassida viridis*, and inhabits Germany. Rarely found in England.

VIBEX. Greenish; dorsal suture sanguineous. A native of Germany. Olivier.

AFFINIS. Wing-cafes greyish, with black dots; thorax yellowish, and without spots. An European species described by Fabricius.

TRUNCATA. Rufous; wing-cafes slightly reticulated, and spotted with black; back gibbous. Fabr. This is of a large size; native place unknown.

GIBBOSA. Black, with two villous golden spots; wing-cafes reticulated with greenish; an obtuse spine on the suture. A large species, described by Fabricius as a Brazilian insect.

BIDENS. Black; anterior part of the wing-cafes projecting, and an erect spine at the suture. Inhabits the same country as the preceding, and is of a large size.

SPINIFEX. Ferruginous; wing-cafes with a projecting spine at the anterior angle; thorax with a transverse spine on each side. Inhabits India. Voet.

BICORNIS. Cyaneous; a truncated spine at the anterior angle of the wing-cafes. Inhabits South America.

PERFORATA. Testaceous; wing-cafes spinous at the anterior angle, and perforated at the base. Pallas.

JAMAICENSIS. Pale yellow, brassy; wing-cafes immaculate with hollow dots. This kind inhabits Jamaica. Olivier.

MARGARITACEA. Greenish; wing-cafes polished silvery-green; head and breast black. Inhabits Saxony. Schaller.

FASTUOSA. Black; wing-cafes brassy red, with black spots. Inhabits the same country as the preceding. Schaller.

FUSCA. Tawny, with two raised lines on the wing-cafes. Laichart.

CRUCIATA. Pale; disk black, with four yellowish spots. Fabr. Spec. Inf. Found on plants in Europe.

CRUX. Yellow; thorax with a ferruginous dorsal line; disk of the wing-cafes ferruginous, with four yellow spots. Fabr. Inhabits Cayenne, and is strongly allied to *C. cruciata*.

UNDECIM-PUNCTATA. Yellowish, single dot in the middle of the thorax, and eleven on the wing-cafes black. A native of Cayenne. Fabr.

BIFASCIATA. Pale; body with two fuscous bands. Inhabits South America. Gmelin.

FLAVA. Yellow, and without spots; body testaceous, with a black spot on the scutellum. Fabr. Found in the south of Europe.

PURPUREA. Yellow; body above purple. This is a small species, and inhabits America.

LEUCOPHÆA. Testaceous; margin dotted with yellow. Found in America. Linn.

TUBERCULATA. Testaceous; margins yellow; three tubercles on the wing-cafes. Inhabits Sierra Leon.

BITUBERCULATA. Brown, with white margin; wing-cafes spotted with black; and a single tubercle at the base. A native of Cayenne. This is greatly allied to *tuberculata*, but is only half the size.

SUTURALIS. Brown; wing-cafes yellow, with brown suture. An African species. Fabr.

BIGUTTATA. Thorax yellow; wing-cafes reddish; margin black, with two yellow spots.

MILIARIS. Yellow; thorax immaculate; wing-cafes dotted with black, and two marginal bands. Inhabits the island of St. Helena.

PUNCTATA. Black; shield brown; wing-cafes yellow, with black spots.

RETICULARIS. Yellow; wing-cafes variegated with azure, and a single lateral band. Fabr. A species of large size found in South America.

VARIEGATA. Rufous; wing-cafes variegated with azure, and a single lateral band. Inhabits America.

TRIFASCIATA. Rufous; wing-cafes with three lateral bands. Fabr. This kind inhabits India.

ANNULATA. Azure; two spots on the thorax, and six rings on the wing-cafes, rufous. Fabr. Is of a large size; inhabits South America and India. A variety of this insect is described by Herbst under the name of *cassida ornata*.

GROSSA. Sanguineous; disk of the wing-cafes sprinkled with black dots, and ramose black lines on the margin. Inhabits South America.

CLATHRATA. Ferruginous; margin of the wing-cafes, longitudinal line, and one half transversely black. Described by De Geer. This species is a native of India. The thorax is immaculate; wing-cafes very broad. The female is distinguished by having three distinct lines across.

SEPTEM-GUTTATA. Black, with seven white spots on the wing-cafes. Gmel. This is rather an ambiguous species.

EXCLAMATIONIS. Yellow, with three black lines, the middle one interrupted, and resembling the note of exclamation, (!). This inhabits South America. Fabr.

LINEATA.

LINEATA. Greyish, with four whitish lines on the wing-cafes. Fabr. Inhabits the Cape of Good Hope.

JAMAICENSIS. Pale brassy yellow; wing-cafes immaculate, with hollow or excavated punctures. Fabr. Described by Sloane in his Natural History of Jamaica.

DORSATA. Thorax and wing-cafes dusky, the last with a spine at the future, and whitish at the margin; base dusky. Fabr. Inhabits Siam.

QUADRIPUSTULATA. Thorax dusky; wing-cafes sanguineous; margin blue, with two red spots. Inhabits America.

CYANEA. Brassy blue; wing-cafes immaculate, with excavated dots. A Linnæan species described by Petiver and Degeer. Inhabits America.

MARGINATA. Wing-cafes testaceous; body and wing-cafes edged with black; thorax brassy. A native of South America.

INÆQUALIS. Brassy ferruginous; wing-cafes with a sub-ovate yellow spot in the disk. Inhabits the same country as the preceding.

SUPPOSITA. Wing-cafes black, annulated anteriorly, with a fulvous dot in the middle. A small American species. Lederm.

LATERALIS. Brassy fuscous, with a yellow lateral spot on the wing-cafes. De Geer, Subzer, &c. Inhabits South America.

DISCOIDES. Brassy green, with two approximate yellow spots on the disk of the wing-cafes. Fabr. *Cassida quadrimaculata*. Degeer. Inhabits South America.

DECUSSATA. Bluish black; wing-cafes spotted with yellow; the dorsal spots reticulated, those on the sides distinct. Inhabits Jamaica. Fabr.

BIPUNCTATA. Yellowish, with two black dots on the wing-cafes. Fabr. Inhabits India.

BIPUSTULATA. Green, with two lateral sanguineous spots on the wing-cafes. Linn. Amœn. Acad. A native of Cayenne.

SEX-PUSTULATA. Azure, with three red spots on the wing-cafes. Inhabits Brazil. Fabr.

SEXDECIM-PUSTULATA. Black; two dots on the thorax, and seven on the wing-cafes red. Fabr. A native of South America.

ANGUSTATA. Yellowish; wing-cafes narrowed behind. Gmel. Inhabits India.

BITUBERCULATA. Brown, with a white margin; wing-cafes spotted with black, and a single tubercle at the base of each. Fabr. Inhabits Cayenne. This species is allied to *cassida tuberculata*, but is only half the size.

TAURUS. Black; wing-cafes with a truncated spine at the anterior angle. Inhabits Cayenne. Fabr. Resembles *C. bicornis*, except in being rather smaller.

RETIFORMIS. Black; thorax with two yellowish spots; wings yellow, reticulated with black. A native of Cayenne. Fabr.

PALLIATA. Black: thorax villous greenish; wing-cafes greenish, with the margin and middle line ferruginous. Fabr. Inhabits Cayenne.

RUBIGINOSA. Ferruginous; thorax and wing-cafes fuscous, dotted; outer margin ciliated. Linn. This species is found in Europe.

CUPREA. Above coppery; edge of the thorax, and two marginal spots on the wing-cafes rufous. A native of Cayenne.

NITENS. Black; thorax and wing-cafes grey, glossed with gold; legs livid. Linn. Native country unknown.

SUPERBA. Black; wing-cafes dotted, and with the shield golden green; antennæ, abdomen, and legs greenish. A Linnæan species. This is found in Europe; the golden

hue mentioned by Linnæus vanishes at the time the insect dies.

SANGUINOLENTA. Golden yellow; oval ring on the wing-cafes, and tubercle on the future sanguineous. Inhabits America.

ARCUATA. Whitish, with a common black disk; the border, oval ring, and posterior arched line fine yellow. Swederus. A native of Rio Janeiro. This is of the middle size, and has the breast and abdomen black.

CASSIDA, in *Ancient Geography*, a town of India, on this side of the Ganges. Ptolemy.

CASSIDARIUS, in the *Ancient Armories*, he who had the care and custody of the *cassides*, or helmets. Spon gives an ancient inscription found at Rome, on a tomb erected to a cassidarius of the emperor Domitian.

CASSIDONY, a name given by the Italians and Germans to a sort of beads made of the yellow and red chalcedony, a very beautiful stone, or of an agate something resembling it in colour. They also call the stones themselves by this name; but are by no means determinate in the meaning of the word, not restraining it to any one peculiar species.

CASSIDONY, in *Botany*. Rai. Hist. Plant. See **LAVANDULA STÆCHAS**.

CASSII, in *Ancient Geography*. See **CATTIVELLAUNI**.

CASSILIACUM, a town of Rhœtia Prima, now called Roma-Kessel.

CASSIMBUZAR, in *Geography*. See **CASSUMBAZAR**.

CASSIMER, or **CASIMER**, in *Commerce*, a thin twilled woollen cloth, much in use for summer wear.

CASSIMIRE, or **CASHMIRE**, in *Geography*. See **CASHMERE**.

CASSINE, in *Botany*, (a name given by the Indians of Florida to a plant once placed under this genus, but now referred to *Ilex*) Linn. Gen. 371. Schreb. 504. Willd. 568. Lam. Ill. 360. Juss. p. 378. Vent. vol. iii. p. 467. Gært. 575. Class and Ord. *Pentandria trigynia*, Linn. (*monogynia*, Lam.) Nat. Ord. *Dumose*, Linn. *Rhamn*, Juss. *Rhamnoideæ*, Vent.

Gen. Ch. *Cal.* perianth small, five-cleft, permanent. *Cor.* deeply five-cleft, so as to be almost pentapetalous; segments somewhat egg-shaped, spreading, larger than the calyx. *Stam.* Filaments five, awl-shaped, alternate with the segments of the corolla; anthers roundish. *Pist.* germ superior, conical; style none, stigmas three. *Peric.* Berry dry, drupaceous, roundish, three-celled, umbilicated with the stigmas. *Seeds* solitary, somewhat egg-shaped.

Eff. Ch. *Calyx* five-cleft. *Corolla* deeply five-cleft; segments alternate with the stamens. Stigmas three. Berry dry, three-celled, three-seeded.

Sp. 1. *C. Capensis*, Linn. Mant. 220. Willd. 1. Lam. 1. Mart. 1. Lam. Illuf. Tab. 130. fig. 3. (*Celastrus*, Burm. Afr. Tab. 85. Phillyrea, Dill. Elth. 315. tab. 236. fig. 305.) "Leaves opposite, egg-shaped, obtuse, serrated; little branches tetraginous." 2. with looser corymbs. Burm. Afr. Tab. 86. *C. colpoon*, Thunb. Willd. *Evonymus*, Colpoon, Linn. Mant. ? A shrub five or six feet high, with a brown or purplish bark. *Leaves* petioled, flat, veined, stiff, smooth. *Flowers* white, in axillary branched corymbs. A native of the Cape of Good Hope. 2. *C. maurocenia*, Linn. Sp. Pl. 2. Mart. 4. Lam. Enc. 7. Illuf. 2. Tab. 130. fig. 1. Gært. tab. 92, fig. 4. (*Frangula sempervirens*, Dill. Elth. 146. tab. 121. fig. 147.) "Leaves opposite, inversely egg-shaped, coriaceous, quite entire; little branches round." A shrub, five or six feet high, as cultivated in Europe, but more lofty in its native climate, with a dark-coloured bark; branches stiff; young shoots deep purple,

or dull red. *Leaves* generally opposite, smooth, convex above, particularly the upper ones, with the edges a little reflexed underneath. *Flowers* small, whitish, in short axillary bunches or corymbs, three or four together, on a slender common peduncle; stamens inserted into a fleshy disk which surrounds the germ, and covers the base of the corolla. A native of South Africa. 3. *Magellanica*, Lam. Ililuf. 3. "Leaves alternate, ovate-lanceolate, acute, obtusely ferrated; flowers axillary, nearly sessile." A native of Magellan found by Commerfon.

Propagation and Culture. The first two species have long found a place in European collections on account of the beauty of their leaves, which continue on the tree all the year. They require no artificial heat, but must be removed into a well sheltered green-house in the winter. The best method of increasing them is by laying down the shoots that are nearest the ground, which should be twisted to facilitate their throwing out roots. Those which are laid down in autumn will be fit to remove in the autumn succeeding. They may be propagated also by cuttings; but in this case they will seldom be rooted enough to transplant in less than two years. The first kind is the least hardy, requires greater care in winter, and seldom ripens its seeds in England. The other produces plenty of fruit, and enlivens the greenhouse throughout the winter.

CASSINE peragua; Linn. Mant. and Mat. Med.—*Caroliniana*; Lam. Enc. See *ILEX Vomitoria*. There is much confusion in authors concerning this plant. In the *Species Plantarum*, Linnæus, as appears from his synonyms, confounded *C. capensis* of recent botanists with the plant in question. Martyn asserts that the *C. peragua* of Miller, quoted by Linnæus in Mantissa, 2. and Mat. Med. as a synonym of his *peragua*, is *ilex vomitoria*, but that the *peragua* of those works is *viburnum lævigatum*; and in this opinion he is supported by Willenow. La Marck, in *Encyc. supposes*, but with a mark of doubt, that his *caroliniana* is the *peragua* of Linnæus; and in his *Illustrations* that his *ilex floridanus* is the *ilex vomitorius* of the *Hortus Kewensis*, without any reference to *cassine peragua* of Linnæus. In Martyn's Miller the leaves of *ilex vomitoria* are said to be less bitter than those of the *cassine*, *cassioberry* bush, or *viburnum lævigatum*, but under the article *Viburnum lævigatum*, no mention is made of any medical qualities possessed by that plant. It appears from Bosc that the North Americans use an infusion of the leaves both of *ilex vomitoria* and of *viburnum lævigatum* as a medicinal beverage.

CASSINE oleoides, concava & lævigata, Lam. Encyc. See *CELASTRUS oleoides, concavus & lævigatus*.

CASSINE, from the Italian word *Cassina*, in the *Military Language*, a house surrounded with a ditch like those of the noblesse in Flanders, or those of the feudal lords or barons, favourable for the reception of a small body of men, who are placed by it out of the reach of an attack or surprise, and can defend themselves in it till detachments come to their relief.

CASSINI, JOHN DOMINIC, in *Biography*, an eminent astronomer, was born of a noble family in Piedmont, in 1625. His distinguished talents for literature were manifested at an early age, and after being assiduously encouraged and cultivated by domestic tutors, they were further exercised and improved at the college of Jesuits in Genoa. Some of his poetical compositions in the Latin language were thought worthy of publication, when he had attained the age of 11 years. But being casually led to the study of astronomy, his progress in this science which suited the bent of his genius, and in which he afterwards so eminently excelled, was so rapid and so great that in 1650 he was invited by the senate of Bologna to accept the chair of mathematical pro-

fessor. When he first went to that city he was no more than 15 years of age; and here employed himself in teaching the mathematics and in various celestial observations. The comet which appeared in 1652, was observed by him with great accuracy; and afforded him an opportunity of ascertaining that comets were not temporary phenomena in the atmosphere, as had been generally supposed, but bodies of the same nature, and probably governed by the same laws as the planets. In the same year he also resolved the astronomical problem, which Kepler and Bullialdus had deemed incapable of solution, for geometrically determining the apogee and eccentricity of a planet from its mean and true place. In the following year, 1653, when the church of Bologna was repaired and enlarged, he obtained leave from the senate to correct and settle a meridian line. See *BOLOGNA* and *MERIDIAN*. In 1657 he assisted a nobleman at Rome in composing some differences that had taken place between Bologna and Ferrara, in consequence of the inundations of the Po; and his conduct on this occasion, as well as the talents he had manifested in other transactions, induced Marius Chigi, the pope's brother, to appoint him in 1663 inspector general of the fortifications of the castle of Urbino; and he was afterwards entrusted for several years with the care of all the rivers in the ecclesiastical state. But he was not diverted by any occupations of this kind from prosecuting his astronomical studies and observations. He discovered many particulars relating to the planets Mars and Venus, and more especially the revolution of the former round its axis; and he directed peculiar attention to the theory of Jupiter's satellites, which after much labour, and many observations, he settled with accuracy, and published at Rome, among other astronomical pieces, in 1666. When Picard, the famous French astronomer, had an opportunity of examining these tables, he found them so accurate that he conceived a high opinion of the skill and judgment of the author, and they contributed so much to extend his reputation that he was invited to become a member of the Academy of Sciences, established about this time by Lewis XIV. As he could not leave his station without the permission of his superiors, the French monarch applied to the pope and senate of Bologna, for this purpose; and they granted him leave of absence for 6 years, so that he came to Paris in 1669, and was immediately appointed royal astronomer. At the expiration of the stipulated term, the pope and senate of Bologna insisted on his return, under penalty of forfeiting his revenues and emoluments, which had been hitherto continued without interruption; but he was nevertheless prevailed upon by the minister to remain in France, where he was naturalized in 1673, and about the same time entered into the marriage state.

The royal observatory having been completed in 1670, Cassini took possession of it in the following year, and assiduously prosecuted the duties of his profession. In 1672, he determined the parallax of Mars and the sun, by comparing some observations which he made at Paris with others that were made at the same time in America; in 1677, he demonstrated that the diurnal rotation of Jupiter about its axis was performed in 9 hours 58 minutes, by means of the motion of a spot in one of his larger belts; and in 1684, he discovered four satellites of Saturn, in addition to that which Huygens had before observed. A new edition of his "*Tables of Jupiter's Satellites*," corrected by later observations, was published in 1693; and in 1695 he visited Bologna for the purpose of examining the meridian line which he had fixed there in 1653, and there he shewed, in the presence of several eminent mathematicians, that it had not for forty years undergone the least variation. In 1700 he continued the meridian line, begun by Picard, to the most southern limits

limits of France. Cassini was a resident at the Royal observatory of Paris more than 40 years; and in that long period he did the greatest honour to the establishment by various observations and discoveries, which it would far exceed our bounds to recite in this article, but which will be duly noticed in their proper places. The titles of his publications occupy nearly five pages in the closely printed index of Rozier. He had the misfortune to be deprived of his sight during the latter years of his life; and he died on the 14th of September, 1712, at the age of 87 years. Mem. of the Paris Acad. for 1712.

CASSINI, JAMES, the younger son of the former, was born at Paris in 1677; and having studied mathematics and philosophy, first at his father's house, and afterwards at the Mazarine college under Varignon, who was mathematical professor, his proficiency was such that at the age of 15 years he acquired great reputation in supporting a mathematical thesis. When he was 17 years old, he was admitted a member of the Academy of Sciences, and at this time accompanied his father to Bologna, and assisted him in verifying the meridian, and other operations. On his return he took a journey to Holland, where he discovered some errors in the measurement of the earth by Snellius, the result of which was communicated to the Academy of Sciences in 1702. In 1696 he visited England, and became a member of the Royal Society. In 1712 he succeeded his father as astronomer royal at the observatory. In 1717 he communicated to the academy his researches on the distance of the fixed stars, in which he shewed that the whole annual orbit is a mere point in comparison with this distance; and in the same year he presented his discoveries concerning the inclination of the orbits of the planets in general, and especially of those of Saturn's satellites and ring. In 1725, he undertook to investigate the cause of the moon's libration. See LIBRATION. His attention was directed in 1732 to an important question relating to the planet Venus. The diurnal rotation of this planet had been determined by his father to be performed in 23 hours, and in a work published by Bianchini in 1729, it was settled at 24 days eight hours. Cassini upon examining Bianchini's observations of the spots of Venus, found that he had intermitted his observations for three hours, and thus had probably been led to mistake new spots for old ones, so as to deduce from the whole an erroneous conclusion. Soon afterwards Cassini ascertained the nature and quantity of the acceleration of Jupiter's motion, at half a second in the year, and of the retardation of Saturn's at two minutes annually; and that these quantities would go on increasing for 2000 years, and then would decrease again. In 1740 he published his "Astronomical Tables," and his "Elements of Astronomy;" both of which are very comprehensive and accurate works. Cassini, though he particularly excelled in the department of astronomy, extended his researches to other branches of science. Accordingly he published some experiments on electricity, or the light produced by friction; the recoil of fire-arms; the ascent of the mercury in the barometer at different heights above the level of the sea; the improvement of burning glasses, &c. In 1700, he assisted his father in the measurement of the meridian; and in 1718 he finished the operation begun by M. de la Hire north of Paris, in concurrence with Maraldi and the younger de la Hire. Hence he was led to conclude, that the degrees of the meridian were not only of different lengths in different parts, but that they decreased more and more towards the pole; and that consequently the figure of the earth was that of an oblong spheroid, having its axis longer than the equatorial diameter. He also measured the perpendicular to the same meridian, and compared the

measured distance with the differences of longitude as before determined by the eclipses of Jupiter's satellites; and he also inferred from this measurement, that the length of the degrees of longitude was smaller than it would be in a sphere, and that therefore the figure of the earth was an oblong spheroid. These conclusions induced the French government to appoint two classes of mathematicians, one for measuring a degree at the equator, and the other at the polar circle; and the result of the whole was a determination that Cassini's conclusions were erroneous, and that the figure of the earth was an oblate spheroid, conformably to Newton's inference from the theory of gravity. Cassini prolonged a life of meritorious labour to an advanced period, and at length lost his life by a fall in April 1756, in the 80th year of his age. His publications were "A Treatise on the Magnitude and Figure of the Earth;" "The Elements or Theory of the Planets, with Tables;" and a great number of papers in the Memoirs of the Academy of Sciences from the year 1669 to 1755.

CASSINI, DE THURY, CÆSAR-FRANÇOIS, the second son of the former, inherited his talents and supported the reputation of the family in scientific researches and discoveries. He succeeded his father as director of the observatory, and he had the honour of being a member of most of the learned societies in Europe. He was born at Paris, June 17th, 1714, and received his first instructions in mathematics and astronomy from M. M. Maraldi and Camus; and his proficiency was such, that he was scarcely 10 years of age when he calculated the phases of the total eclipse of the sun of 1727. At the age of 18 he assisted his father in drawing the perpendicular to the observatory-meridian from Strasbourg to Breit; and the business of traversing the country by several lines parallel and perpendicular to the meridian of Paris, with a view to the formation of a general chart of France, was entrusted to Cassini. He also undertook to measure the meridian of Paris by a new series of triangles, of a smaller number, and more advantageously disposed than those employed by his grandfather and father, for the purpose of obtaining a more accurate result. This great work was published in 1740, with a chart, shewing the new meridian of Paris, by two different series of triangles, passing along the sea-coasts, to Bayonne, traversing the frontiers of Spain to the Mediterranean and Antibes, and thence along the eastern limits of France to Dunkirk, with parallel and perpendicular lines described at the distance of 6000 toises from one another, from one side of the country to the other. In 1735, he was admitted into the academy as adjunct supernumerary. A particular chart of France, constructed at the special suggestion of the king, took its rise from a tour made by Cassini in Flanders, in company with his majesty, about the year 1741. He also published various works relative to these charts, and a great number of the charts themselves. In 1761, he undertook an expedition into Germany; for the purpose of continuing to Vienna the perpendicular of the Paris meridian; of uniting the triangles of the chart of France with the points taken in Germany; of preparing the means of extending into this country a plan similar to that of France; and of thus establishing successively for the whole of Europe a very useful uniformity. His observations of the transit of Venus, on the 6th of June, 1761, made during his stay at Vienna, were published in his "Voyage en Allemagne." Availing himself of the peace which afterwards took place between England and France, with a view to the accomplishment of his great object, he proposed the joining of certain points taken upon the English coast with those which had been determined on that of France, and thus connecting the general chart of the

the latter with that of the British isles, in a manner similar to that by which he had united it with those of Flanders and Germany. This proposal was favourably received by the English government, and carried into effect, under the direction of the Royal Society, by which the execution was committed to the late general Roy. After his death it was for some time suspended; but the farther execution of it was committed, under the auspices of the duke of Richmond, then master-general of the ordnance, to the care of col. Edward Williams and captain William Mudge, respectable officers of the artillery, and Mr. Isaac Dalby, who had before assisted general Roy.

The volumes of the Memoirs of the French Academy, between the years 1735 and 1770, contain a prodigious number of papers communicated by M. Cassini, and consisting of astronomical observations and questions; among which are "Researches concerning the Parallax of the Sun, the Moon, Mars, and Venus; "On Astronomical Refractions, and the Effect caused in their Quantity and Laws by the Weather;" and "Numerous Observations on the Obliquity of the Ecliptic, and on the Law of its Variations." In short, Cassini cultivated astronomy for 50 years, a period the most important, in relation to that science, that ever elapsed, with regard to the magnitude and variety of objects in which he commonly sustained a principal part. His constitution was strong and vigorous, and enabled him to surmount the fatigue that attended those laborious operations in astronomy and geography, which he had the merit of conducting. However, the last twelve years of his life were rendered painful and distressing by an habitual retention of urine; and it was at length terminated by the small-pox on the 4th of September, 1784, in the 71st year of his age; being succeeded in the academy, and as director of the observatory by his only son, count John-Dominic Cassini, the 4th in order by direct descent in that honourable station. Hutton's Math. Dict.

CASSINIAN CURVE, or **CASSINOID**, in *Astronomy*, a curve of an elliptic form, proposed by M. John-Dominic Cassini, to be the orbit of a planet. The property of this curve is, that the product of two lines drawn from its foci to any point in the curve, shall be equal to a given quantity, viz. to the rectangle under the aphelion and perihelion distances of the planet; whereas, in the common ellipsis, the sum of two lines from the foci to any point in the curve is equal to the sum of the above distances, or transverse diameter. M. Cassini supposed that a planet would describe this curve about the sun, in one of its foci, in such a manner that the angles at the other focus are proportional to the times, which he calls the *focus*, or *centre of mean motion*; and that in which the sun is placed, he calls the centre of true motion. Whence, any two distances of a planet from the focus of the true motion are reciprocally as its distances from the focus of mean motion. In this figure, if the less axis exceeds the distance of the foci, the curve is every where concave towards the centre: if, while the principal axis remains the same, the distance of the foci is lessened, the minor axis will be increased; and, when the foci meet in the centre, the figure will become a circle; but if, on the contrary, the distance of the foci be increased, the less axis will be lessened, and will become equal to the said distance, since the distance is, to the principal axis as unity to a mean proportional between one and three. If the distance of the foci be farther increased, the minor axis will be lessened, the curve will at length have a point of contrary flexure, and will, at the ends of the minor axis, be convex towards the centre; and when the distance of the foci is so far increased, as to be in the same proportion to

the greater axis as the side of a square to the diagonal, that is, as 1 to $\sqrt{2}$, the less axis will become nothing, and the curve extend to the centre on each side. If the distance of the foci be greater in proportion to the transverse diameter, than in the above ratio, the less axis is impossible, and the figure turns into two conjugate ones, at a distance from each other; which, upon the increase of the distance of the foci, will be lessened, till at length the figure runs into two conjugate points. The distance of the foci increasing, the two conjugate figures do again emerge, and they increase after the same manner as they decreased before; differing from the former in the order of the foci, and of the vertices, and are increased till they become infinite. Afterwards, this system will again approach to a circle by the same degrees as it receded from it. After tracing a few of the properties of this curve, it must be evident that it cannot possibly be the orbit of a planet; for it is certain, that in all those cases, where it passes into two conjugate figures, it deviates from what is essential to the nature of an orbit, namely, *continuity*; and in all those cases where it is, at the end of the minor axis, convex towards the centre, the planet would need a centrifugal force to describe such parts of its orbit; that is, it would require at equal distances from the sun, sometimes a *centrifugal*, and sometimes a *centripetal* force to retain it in its orbit, which is totally incompatible with all the laws of nature. It may be fairly concluded, that when all the species of a figure beyond a certain limit are unfit for discharging any office of nature, the remaining species on the other side of the limit should be rejected also: and when, in addition to this, it is considered that the celestial observations are not consistent with this curve, it can by no means be admitted into astronomy.

CASSINOMAGUS, in *Ancient Geography*, *Chassenon*, a place of Gaul in Aquitania Prima, 30 French leagues from Sermanicomagus, and 17 from Augulorium or Limoges.

CASSIOBERRY-BUSH, in *Botany*. See *VIBURNUM levigatum*, and *LEX vomitoria*?

CASSIODORUS, **MAGNUS AURELIUS**, in *Biography*, a Roman senator, born at Brutium, on the confines of Calabria, who flourished in the time of Theodoric the Goth, in the 6th century, who died in 562, at the great age of 93, and who has been enumerated among the few Roman writers on *music*; but to whom neither the art nor the science has great obligations. Cassiodorus, contemporary with Boethius, has given us even less information on the subject than the excellent author of the discourse "De Consolatione Philosophiæ:" for, writing on the seven liberal arts (de septem disciplinis), all that he says concerning music is contained in one chapter only, consisting of but four 4to. pages, and these few pages, which hardly contain the skeleton of a treatise, give us nothing but repetitions of what his predecessors have said more fully. And it may, indeed, be asserted, without exaggeration, that all the Gr. and Lat. tracts that are come down to us, are but bullets of the same calibre, which teach us no part of music but the alphabet, nor can any thing be acquired by the most intense study of them, except despair and the head-ache.

CASSIOPEA, or **CASSIOPE**, in *Ancient Geography*, a port of the sea of Epirus, in the southern part of Chaonia, S.W. of the port of Panormus. Pliny, Strabo, and Ptolemy, mention this city; but M. D'Anville has not placed it in his map. Cassiope, or Cassope, was famous on account of the temple of Jupiter Cassius, whence some derive its name.

CASSIOPEI, a people of Greece, mentioned by Strabo, who

who inhabited Cassiopæa, or Cassiope. This author assigns to Cassiopæa a town and port of the same name, and three other small towns in the interior of the country. Pliny also mentions the Cassiopæans, and places them in the vicinity of the Dryopes. M. D'Anville fixes their situation on the sea-coast in Thesprotia, towards the upper extremity of the southern part of the island of Corcyra.

CASSIOPÆUM *Promontorium*, a promontory of the island of Corcyra.

CASSIOPE, a town and sea-port in the northern part of the island of Corcyra, according to Ptolemy and Strabo, who place also a promontory of the same name in this island. It is also mentioned by Cicero and Pliny.

CASSIOPE, a town of Greece, in Cassiopæa, according to Ptolemy. He places this in the mountains, and more easterly than the other.

CASSIOPE, or CASSIOPEIA, in *Fabulous History*, wife of Cepheus, king of Ethiopia, and mother of Andromeda. Boasting that she was more beautiful than the Nereids, these were so incensed that they besought Neptune to revenge the affront; upon which he sent into the country of Cepheus a sea-monster, who committed dreadful ravages. In order to appease the god, Andromeda was chained to a rock, and exposed to the monster; but was rescued by Perseus, who married her, and obtained of Jupiter, that Cassiopeia might be placed, after her death, among the stars. This circumstance is said to have given occasion to the constellation of that name.

CASSIOPEA, in *Entomology*, a name given by Cramer to an African butterfly described by Fabricius under the title of PAPILIO ARGIA. The wings are roundish, of a white colour; anterior pair white, black at the apex, and marked on the lower surface near the tip, with a large brown spot.

CASSIOPEIA, or CASSIOPEA, in *Astronomy*, one of the 48 constellations of the northern hemisphere, situate next to Cepheus, not far from the north pole.

In 1572, there appeared a new star in this constellation, which at first surpassed in magnitude and brightness Jupiter himself; but it diminished by degrees, and at last disappeared, at the end of eighteen months. It alarmed all the astronomers of that age, many of whom wrote dissertations on it; among the rest Tycho Brahe, Kepler, Maurolycus, Lyceus, Gramineus, &c. Beza, the landgrave of Hesse, Rofa, &c. wrote to prove it a comet, and the same which appeared to the Magi, at the birth of Jesus Christ, and that it came to declare his second coming: they were answered on this subject by Tycho. Several astronomers are of opinion that this star has a periodical return, which Keill and others have conjectured to happen every 150 years. Mr. Pigott adopts the same opinion; and he accounts for its not being noticed at the completion of every term by its variable lustre at different periods, so that it may sometimes increase only to the 9th magnitude: and if this be the case, its period is probably much shorter. Phil. Transf. vol. lxxvi. p. 193. Dr. Herschell has given a statement of the comparative lustre of the stars of this constellation in the Phil. Transf. for 1796, vol. lxxxvi. p. 463.

The stars in the constellation *Cassiopeia*, in Ptolemy's Catalogue, are thirteen; in Hevelius's, thirty-seven; in Tycho's, forty-six; but in the Britannic Catalogue, Mr. Flamsteed makes them fifty-five.

CASSIOTIS, in *Ancient Geography*, a name given by Ptolemy to a country of Egypt, in the vicinity of mount Casius; bounded, on the east by a part of Judæa and Arabia Petræa.—Also, a country of Asia in Syria, in which

Ptolemy has placed 12 towns. This country took its name from mount Casius in Syria.

CASSIPOUNEA, in *Botany*, Aubl. Juss. See LEGNOTIS.

CASSIR, q. d. *Casile*, in *Geography*, a town of Africa, in the northern part of the eastern province of Algiers, situate amongst the Beni Grohbery, N. of mount Aphroune, and W. of Boujeiah or Bugia. Upon the mountains adjacent to this place the Algerines frequently dig up large pipes of lead, supposed to have formerly conveyed the excellent water of these parts to Saldæ.

CASSIR *Afrite*, a town of Africa, in the kingdom of Tunis, near the gulf of Hamamett; about 30 miles S.E. of Tunis. This lies upon the ruins of a city, called by the ancients "Civitas Siagitana."

CASSIR *Attire*, a place of Africa, in the eastern province of Algiers, lying a little to the southward of Setceef, famous for its adjacent plains and pasture grounds, which are cultivated by the Raigah, a clan of Arabs, noted for the breeding of cattle, particularly of horses, that are reckoned the best in this kingdom.

CASSIS, a town of France, in the department of the Rhone, on the coast of the Mediterranean, with a small port; 8 miles S.E. of Marseilles.

CASSIS, in *Military Language*, the same as CASK; which see.

CASSITAH, in *Geography*, an Indian town of America, which, as well as the Coweta town, is 60 miles below the Horse-ford or Chattahoosee river.

CASSITERIA, in *Natural History*, the name of a genus of crystals. The word is derived from *κασσιτερος*, tin; and expresses crystals which are influenced in their figures by an admixture of the particles of that metal. These are all pyramidal without columns, and composed only of four sides or planes. Of this genus there are only two known species, the whitish and the brown; found in Devonshire and Cornwall.

CASSITERIDES, in *Ancient Geography*, an appellation which formerly comprehended Great Britain and Ireland, and which was afterwards restricted to the isles of Scilly, famous, as well as the neighbouring coast of Cornwall, for their tin, which, according to Pliny, (l. xxxiii. c. 16.) was white and the most valuable, and called by the Greeks *castieron*. Strabo says (Geog. vol. i. p. 265. ed. Casaub.) that they were 10 in number, situated near one another and toward the north from the port of the Artabri. One was a desert island; the rest were inhabited by a people wearing black garments, which hung down to their heels and were bound round their breasts. They subsisted on their herds and had no fixed habitations; but they supplied those who traded with them with tin, lead, and skins, in exchange for which they received earthen vessels, salt, and brass. The Phœnicians, says this geographer, were in ancient times the only persons who carried on this commerce with them, sailing hither from Gades, but concealing their navigation from the rest of the world. The Greeks succeeded the Phœnicians, and they were at length followed by the Romans. Cassiterides, in the Greek language, denotes "the islands of tin;" but this name was probably derived from some Phœnician or Celtic term. The Chaldeans and Arabians used words very similar to signify tin. Thus in Numb. xxxi. 22, for the Hebrew כְּסֵלִי, and Greek *κασσιτερος*, Jonathan has קַסְטִירָא, *kastira*, and the Jerusalem interpreter קַסְטִירָא, *kistira*, and the Arabs كَدِير, *kasdir*: and in the Talmudic tract of the Sanhedrin קַסְטִירָא, *kastirion*, is tin. From these different modes of expression, we may infer that the term was borrowed from other nations by the Greeks.

Bochart, Geog. Sacr. apud. Oper. vol. i. p. 650. These islands were also denominated "Sorlings," which, in the language of the Britons, signifies "separated from the height of the land;" and it has been suggested, that the term "Cassiteride" may be composed of Briton or Celtic words, viz. "Kaz i ter i" signifying "they are almost separated." According to this etymology, the name *κασσιτερος* succeeded that of "Cassiteri;" and it has been inferred that the Phœnicians derived their tin from the islands denominated Sorlings, as well as from the country of Cornwall.

CASSITHA, in *Botany*, Tabern. See *CUSCUTA*.

CASSIUM, in *Geography*, a town of Africa in the country called Cassiotis. Ptolemy.

CASSIUS, CAIUS, in *Biography*, a celebrated Roman, was the descendant of an ancient and honourable family, so zealous for the public liberty, that one of his ancestors, Sp. Cassius, after a triumph and three consulships, is said to have been condemned, and put to death by his own father, for aiming at dominion. C. Cassius himself manifested at an early age his hatred of tyranny; for hearing, when he was a boy at school, Faustus, the son of Sylla, boasting among his school-fellows of his father's greatness and absolute power, he gave him a box on the ear; and he afterwards declared, in the presence of Pompey, who demanded an account of the quarrel, that if Faustus should dare to repeat the words, he would repeat the blow. In the Parthian war he was questor to Crassus, and signalized himself both by his courage and skill, and if Crassus had followed his advice, would have preserved the whole army. After the defeat and death of this leader, B. C. 53, he made good his retreat with the remains of the broken legions into Syria; and when the Parthians who pursued him blocked him up in Antioch, he preserved that city and province from falling into their hands; and, watching his opportunity, gained a considerable victory over them, with the destruction of their general. In the civil war between Cæsar and Pompey, he took part with the latter, and commanded his fleet. After the battle of Pharsalia, B. C. 48, he sailed with 70 ships to the coast of Asia, with a view of raising forces, and renewing the war against Cæsar; and as soon as he had obtained intelligence where Cæsar, who crossed the Hellespont with a small force, designed to land, he lay in wait for him, in the bay of Cilicia, at the mouth of the river Cydnus, with a resolution to destroy him; but Cæsar landing on the opposite shore before he was aware, and his project being thus blasted, he thought it most prudent, whilst all the people of the country were declaring for him, to make his own peace, by joining the conqueror with his fleet. He still, however, retained his strong dislike of usurped authority; and when Cæsar had been created perpetual dictator, and seemed to aspire after royal honours which every true Roman detested, he formed a conspiracy against his life, and urged his friend and brother-in-law, Brutus, to take a lead in the execution of his purpose. His resolution to destroy Cæsar has been ascribed to motives of private disgust and resentment, and particularly to his being refused the consulship and to Cæsar's having conferred on Brutus the more honourable prætorship in preference to him. Hence it has been said, that he hated the tyrant rather than the tyranny, and that in the prosecution of the whole design he manifested a peculiar rancour. But we need not be at a loss for the true motive of his conduct, if we advert to his temper and principles. He was singularly impetuous and violent, impatient of contradiction, and much more of subjection, and passionately fond of glory, virtue, and liberty. From these qualities Cæsar apprehended his danger; and when admonished to beware of

Antony and Dolabella, he used to say, that it was not the gay, the curled, and the jovial, whom he had cause to fear; but the thoughtful, the pale, and the lean; meaning Brutus and Cassius. For the progress and termination of this conspiracy; see M. J. BRUTUS and CÆSAR. After Cæsar's assassination, the conspirators withdrew from Rome. Cassius proceeded to Greece and joined Brutus at Athens. Having raised a considerable body of troops in Lesser Asia, he marched into Syria, the government of which had been assigned him by Cæsar, and having made himself master of the country, he passed into Phœnice and Judæa, and then laid siege to Laodicea, whither Dolabella, who was endeavouring to take possession of Syria, had been under a necessity of retreating. Cassius, having taken the town, treated it with great severity; plundering its temples, levying oppressive contributions, and putting to the sword many of the chief inhabitants. Whilst he was preparing to invade Egypt, Brutus urged him to oppose Antony and Octavianus, who were preparing to cross over into Macedon. He joined Brutus at Smyrna, and at his recommendation, it was determined that Brutus should reduce the Lycians, whilst he undertook the expedition against the Rhodians. After some unsuccessful engagements on their part, the city of Rhodes was invested by sea and land, and compelled to surrender. Cassius treated the vanquished in the true spirit of a Roman general. Having placed his tribunal in the forum with a spear planted before it, he restrained his soldiers from all plunder or violence; and summoning 50 of the principal citizens before him, caused them immediately to be put to death. Having accumulated from the spoils of the city the sum of 8000 talents, and ordering the commander of the garrison, which he left behind him, to levy from the inhabitants 500 more, he returned to the continent, and proceeded to join Brutus, exacting from all the provinces of Asia, as he passed, a payment of 10 years' taxes. His junction with Brutus at Sardis was followed by occurrences, of which a brief recital has been given under the article BRUTUS. On the plains of Philippi the combined army of these two commanders met that of the triumvirs; and in the engagement that ensued, the ardour of Brutus in pursuing the troops of Octavianus left him exposed, and at length obliged him to retire with a small band from the field of battle. Titinius in the mean while was dispatched to gain intelligence; and when Cassius, perceiving from the eminence on which he stood that he was surrounded by a body of cavalry, which he apprehended to be that of the enemy, and not a detachment of friends coming to their relief, as in fact it was, imagined that Titinius was taken prisoner, he reproached himself for exposing a dear friend to such an accident, and withdrew to his tent. He was accompanied by Pindarus, one of his freedmen, who had constantly attended him ever since the battle in which Crassus was slain, for the purpose of performing the last office for him, if occasion should require it. The circumstances of his death have not been ascertained: some say that he dispatched himself with the dagger with which he stabbed Cæsar; but the fact was, that his head was found severed from his body, and that Pindarus no more appeared. This event occurred on the birth-day of Cassius, B. C. 42.

Cassius was a prudent and valiant commander, and an ardent lover of his country; and though he was in many respects inferior to Brutus, and chargeable with extortion and cruelty, he has been honoured as an assertor of the liberties of Rome, when they were just expiring, and he has shared with Brutus in the distinguishing appellation of "last of the Romans." He was learned himself, and a patron of literature;

literature; several of his letters to Cicero are extant; and that great orator bestows praises on him in various parts of his works. If we compare Cassius with his friend Brutus, the latter was the more amiable friend, and the former the more dangerous enemy. Cassius has been charged with violence and cruelty in his mode of exacting money and other necessaries from the cities of Asia. But it has been urged in vindication of his conduct, that he was engaged in an inexorable war, where he must either conquer or perish with the republic itself, and in the prosecution of which his legions were not only to be supported, but rewarded; the revenues of the empire were exhausted; contributions were scanty; neighbouring states wished to maintain their neutrality. In these difficult circumstances, when money was necessary, and it could only be obtained by force, extortion, it is said, became necessary; the necessity of the end justified the means; and when the safety of the empire, and the liberty of Rome were at stake, it was no time to listen to scruples. This was Cassius's mode of reasoning, and the ground on which he acted; whilst he applied all his thoughts to the support of the cause which he had undertaken. Brutus, on the other hand, being of a temper more mild and scrupulous, contented himself generally with the regular methods of raising money; and from his love of philosophy and the polite studies, having contracted an affection for the cities of Greece, instead of levying contributions, used to divert himself, wherever he passed, with seeing their games and exercises, and presiding at their philosophical disputations, as if travelling rather for curiosity than to provide materials for a bloody war. When he and Cassius therefore met, the difference of their circumstances shewed the different effects of their conduct. Cassius, without receiving a penny from Rome, came rich and amply furnished with all the stores of war. Brutus, who had received large remittances from Italy, came empty and poor, and unable to support himself without the help of Cassius, who was obliged to give him a third part of that treasure, which he had been collecting with so much envy to himself for the common service. In his latter years Cassius deserted the Stoics, and became a convert to Epicurus, whose doctrine he thought more natural and more reasonable; constantly maintaining, that the pleasure, which their master recommended, was to be found only in the habitual practice of justice and virtue. Whilst he professed himself therefore an Epicurean, he lived like a Stoic; being moderate in pleasures, temperate in diet, and through life a water-drinker. In the letters addressed to him by Cicero, though he rallies his Epicurism, and change of principles, yet he allows him to have always acted with the greatest honour and integrity; and pleasantly says, "that he should begin to think that sect to have more nerves, than he imagined, since Cassius had embraced it." Plutarch, *Vit. Brutus apud Opera*, T. i. p. 984. Middleton's *Life of Cicero*, vol. ii. *Anc. Un. Hist.* vol. x & xi.

CASSIUS, AVIDIUS, an eminent military commander in the reign of Marcus Aurelius and an usurper of the empire, was, according to Dion Cassius, a native of Syria, and a son of Heliodorus, the rhetorician; but the author of his life, Vulcatius Gallicanus, seems to make him the son of Avidius Severus, who was raised from the rank of a centurion to the highest dignities of the state, and as a man of merit, much regarded by Aurelius. The same writer represents him as by his mother's side a descendant from the ancient Roman Cassii. Crevier disputes that genealogy, though, as he says, he possessed all their haughtiness, insolence, and antipathy against monarchical government; adding to these qualities great skill in the art of war, and ta-

lents that commanded the fear and obedience of the soldiers. The first account we have of him is that of his commanding an army against the Parthians under the emperor Verus, about the year 164, whom he entirely defeated near Europus, a city of Syria. Improving this victory over Vollogeses II. king of the Parthians, he passed the Euphrates, took Ctesiphon, and demolished the royal palace. He likewise subdued Edeffa, Babylon, and all Media; and though Seleucia on the Tigris opened its gates to him, he ordered the inhabitants, amounting in number to 400,000, to be inhumanly massacred, and the city to be utterly destroyed. On his return he lost great numbers of his men by famine and disease; however, he put an end to the war, and obtained for the indolent Verus, who had never joined him at Antioch, the title of conqueror of the Parthians and Medes. Cassius, having acquired the reputation of a rigid disciplinarian, was invested by Aurelius with the command of the legions of Syria; nor did he disappoint the hopes which the emperor had conceived of him. Whilst he had this command, he marched against the Egyptians, who had revolted, and contrived to subdue them by policy rather than force, and he afterwards performed great exploits in Armenia and Arabia. In the war against the Sarmatian Jazyges, he punished with an ignominious death some centurions who had crossed the Danube without orders, though they had killed 3000 of them and returned to the camp with very considerable booty. This severity occasioned a mutiny in the army; but Cassius, with invincible intrepidity, appeared unarmed in the midst of the incensed multitude, calling out aloud to them, "kill me; and to your neglect of duty, add the murder of your general;" and by this intrepid valour, he quelled their fury and recalled them to their duty. Whilst he inspired his soldiers with awe, he likewise engaged their attachment; and though, among the inconsistent accounts that occurred of his character he is generally represented as chargeable with atrocious vices, inasmuch that he has been denominated a second Catiline, he seems to have possessed the qualities necessary for constituting a great commander. When he commanded in the Parthian war, Verus suspected his ambitious designs, and communicated his apprehensions to M. Aurelius, his partner in the empire. But the philosophical emperor took no notice of the charge that was alleged against him; but continued to entrust him with the command of the army in the East. In the 15th year of Aurelius's reign, A. D. 175, Cassius threw off all disguise, and ventured to declare himself his rival in the empire. With this view he availed himself of an illness, under which Aurelius laboured during his war against the Marcomanni, to circulate a report of his death, and to cause himself to be proclaimed emperor in his room. Having assumed this title, he soon reduced all the countries beyond mount Taurus, and the governor of Egypt declared in his favour; several foreign princes and nations respected his cause, and none with greater zeal than the Jews. Whilst he was successfully pursuing these measures for the establishment of his power, he feigned great respect for the memory of Aurelius, and placed him among the gods. As soon as the news of this revolt reached Rome, the senate instantly declared Cassius a traitor, and confiscated his effects; but the emperor, with singular moderation, left Germany and pursued his march as far as Illyricum towards the east; proposing to resign the empire to his competitor, if the gods should judge it expedient for the public good, that Cassius should reign, and not Marcus Aurelius. He had not proceeded far before he received the news, that Cassius had been killed in consequence of a conspiracy among his inferior officers. When the head of Cassius was brought to the emperor, he

expressed much sorrow, turned away his eyes from it, and caused it to be honourably interred, complaining, that he had been deprived of an opportunity of showing his mercy. The reign of Cassius, or rather his dream, as Dion Cassius calls it, lasted but three months and six days. M. Aurelius would neither try, imprison, nor condemn any senator concerned in the conspiracy; but referred the whole to the senate, appointing a day for the criminals to appear before their judges. His wife and children were treated with unexampled clemency by the emperor; but Commodus afterwards indulged his cruel disposition by burning alive all who were in any degree related to him. Crevier's Rom. Emp. Vol. vii. Anc. Un. Hist. vol. xiii.

CASSIUS *Parmensis*, a Latin poet, was one of the conspirators against Cæsar, and after the event of his assassination, attached himself first to Pompey's son, and afterwards to Antony, holding commands under each of them. After the battle of Actium he retired to Athens, where he was put to death by Quintilius Varus, who executed the orders of Octavianus, while Cassius was at his studies. Horace in his epistle to Tibullus makes honourable mention of him:

"Scribere quod Cassi Parmensis opuscula vincat."

Epist. iv. lib. i.

But in another place he seems to describe him rather as a rapid and copious, than as an excellent poet. See Sat. x. lib. i.

His papers were carried off by Varus, whence it is probable that the tragedy of Thyestes, ascribed to Varus, was written by Cassius. The verses on Orpheus, published by Achilles Tatius, under the name of Cassius, are thought to be spurious. Voss. de Poet. Lat. Gen. Dict. Gen. Biog.

CASSIUS SEVERUS, TITUS, a Roman orator in the age of Augustus, more odious for his character than admired for his genius. Besides the pleasure which he derived from exercising the office of an accuser, often on very trivial grounds, he was so much addicted to satire and calumny, that his writings occasioned a law against libels to be passed by Augustus, and drew upon himself a sentence of exile first to Crete, and afterwards to Scirphos, where he died in extreme wretchedness. Notwithstanding the bad qualities of Cassius, he was one of the ablest pleaders of his time, and is represented by Seneca as possessing every qualification of a good declaimer. Although he particularly excelled in extempore speaking, he never neglected previous preparation, but wrote down the greatest part of what he intended to speak. Tacitus, if he be the author of the Dialogue on Orators, represents Cassius as the first corrupter of ancient eloquence; and Quintilian, though he allows him ingenuity, quickness, and force, represents him as deficient in gravity and judgment. Gen. Dict.

CASSIUS'S *purple powder*, or *mineral powder*, in *Chemistry*, so called from the discoverer, is obtained by mixing a largely diluted solution of gold, with the solution of tin in nitro-muriatic acid, carefully prepared. This precipitate is a mixture of imperfect oxyd of gold with perfect oxyd of tin. Its principal use is in enamel and porcelain painting. See GOLD.

CASSOCK, a kind of surtout, or long upper garment, worn over the rest of the habit; particularly by the clergy, and anciently likewise by the laity. The word comes from the French *casaque*, a *horseman's coat*: some derive them again, by corruption, from a garment of the Cossacks: others derive the name *cassock*, as well as the thing, from the ancient *caracalla*, a sort of upper garment which hung to the heels.

CASSON, in *Geography*. See KASSON.

CASSONADE, in *Commerce*, cask sugar, or sugar put into casks or chests, after the first purification, but which has not been refined. It is sold either in powder or in lumps; the whitest, and that of which the lumps are largest, is the best. Many imagine it to sweeten more than loaf-sugar; but it is certain that it yields a great deal more scum. See SUGAR.

CASSOPO, in *Geography*, a town of the island of Corfu, 8 miles N. of Corfu.

CASSOTIS, in *Ancient Geography*, a fountain of Greece, in the Phocide, and in the vicinity of Delphos. Pausanias.

CASSOVA, in *Geography*. See CASCHAU.

CASSOVA, *Plain of*, a tract of country in European Turkey, which separates Rascia from Bulgaria, noted on account of the victories of the two first Amuraths.

CASSOWARY, in *Ornithology*. See STRUTHIO *Cassarius*.

CASSUMBAZAR, CASSIMBAZAR, or COSSIMBAZAR, in *Geography*. See COSSIMBAZAR.

CASSUMUNAR, in the *Materia Medica*. See CAS-SAMUNAR.

CASSUTHA, in *Botany*, Rumph. See CASSYTA.

CASSUVIUM, Rumph. Lam. Juss. See ANACARDIUM.

CASSYTA, Linn. gen. 505. Schreb. 690. Willd. 802. Juss. p. 439. Gært. 160. (*Volutella*, Forsk. *Collodium*, Lour. *Cochin.*) Class and ord. *Enneandria monogynia*. Nat. ord. uncertain. Juss.

Gen. Ch. *Cal.* perianth three-leaved, very small, permanent; leaves semi-ovate, acute, concave, erect. *Cor.* petals three, roundish, acute, concave, permanent; nectary of three glands, oblong, truncate, coloured, the length of the germ, and standing round it. *Stam.* filaments nine, erect, compressed; glands two, globular, seated on the sides of the base of each of the three interior filaments; anthers adnate to the filaments below their tip. *Pist.* germ egg-shaped, within the corolla and calyx; style rather thick, the length of the stamens; stigmas slightly trifid, obtuse. *Peric.* receptacle increased into a depressed-globular drupe, crowned with the converging calyx and corolla, perforated with a navel. *Seed*, nut globular, acuminate, with the converging stamens. Linn. Schreb. and Mart.

Cal. one-leaved, permanent; segments six, ovate-acute, straight, concave; three interior ones resembling petals. *Cor.* none. *Stam.* nine, in several ranks; filaments compressed; anthers fixed below their tips; accompanied by nine yellowish, glandular bodies; six of which are fixed to the base of the three interior stamens, one on each side; the three others alternate with those stamens, oblong, truncate. *Pist.* germ superior, ovate; style thick, stigma obtuse; slightly trifid. Lam. and Bosc.

Cal. one-leaved, globular, lessened at the border, six-cleft, converging; the inner alternate, segments (petals, Linn.) a little larger; bractes at the base (calyx, Linn.) three, very small. *Cor.* none. *Stam.* filaments twelve, inserted in a double order into the top of the calyx; the six exterior ones fertile, naked at the base, opposite to the segments of the calyx; the six interior ones opposite to the former; three fertile, with two glands at the base of each; three alternate with them, barren (nectary, Linn.), resembling tubercles; anthers adnate to the anterior side of the fertile filaments, two-celled (two-valved from the base to the tip?). *Pist.* germ superior; style thickish; stigma obtuse (slightly trifid?). *Peric.* capsule globular, one-seeded; covered by the converging, somewhat-berried, calyx. Juss.

Eff. Ch. *Corolla* resembling a calyx, six-cleft; nectary, three truncate glands surrounding the germ; interior filaments glanduliferous. Drupe one-seeded. Willd.

Belly of the mature calyx globular, berried, investing the seed. Filaments six or nine; interior ones with two glands at the base. Nut superior, one-seeded, without valves, clothed with the berried calyx. Gært.

Obs. Authors differ so much with respect to the parts of fructification, that we have given the above descriptions separately and at full length.

Sp. 1. *C. filiformis*, Linn. Sp. Pl. Gært. tab. 27. f. 4. Lam. Pl. 323. Jacq. Hilt. Amer. 115. tab. 79. "Filiform, lax, enncandrous; calyx entirely covering the nut." *Stems* parasitical, twining, slender, succulent, branched, leafless, putting out numerous warts, resembling the feet of caterpillars, by which they adhere so strongly to the stems and leaves of shrubs, as not to be separated from them; and when they have affixed themselves to these, they no longer draw any nourishment from the soil. *Flowers* white, with a small tinge of red, very small, in lateral loose spikes, at different distances, scentless. *Fruit* about the size of a pea, pellucid, white, shining, sweet to the taste; nut black, with a yellow kernel. A native of the West Indies. 2. *C. zeylanica*, Gært. tab. 27. fig. 4. b—G. (*Cuscuta rumbut-putri*, Rumph. Amb. 5. p. 49. tab. 184. fig. 4. C. ind. & zeyl. Herm. 67. & 42. Burm. Zeyl. 84.) "Flowers hexandrous; calyx not covering the whole nut." The green, tender twigs producing a few very small leaves, coming out several together. *Calyx* furnished at the edge with six, pale, obtuse, concave, distant scales, resembling little teeth; three of them shorter, and a little without the others, but all converging. *Stamens* in a single order within the scales; three shorter, corresponding with the larger scales, awl-shaped; three longer, placed within the smaller scales, furnished on each side near the base with a globular gland, as in the preceding. *Nut* globular, terminated by a short style and three stigmas, of a dark chestnut colour, smooth, one-celled, valveless. Gært. A native of the East Indies. Linnæus and most other authors consider the East and West Indian plants as one and the same species; but Gærtner separates them, and if his description of the latter, taken from a specimen of the fruit preserved in the Leyden museum, be accurate, they are certainly distinct. 3. *C. corniculata*, Linn. Mant. 277. Burm. Ind. 93. tab. 33. fig. 1. (*Cassutha cornea*, Rumph. Amb. 7. p. 56.) "Branches woody, spinous." *Branches* a foot long, the thickness of a finger; spines solitary, recurved. *Leaves* shorter than the spines, lanceolate-linear. *Berries* nearly sessile. A native of mountains in the island of Celebes; received also from Java by Burman in 1758. Linnæus refers it to this genus on the authority of Burman, but recommends a more accurate examination of its parts of fructification. Jussieu doubts whether it really belongs to this genus, since it differs so much from the preceding species in the spines and disposition of the parts.

Propagation and Culture. The first species, according to Miller, is easily propagated in the summer months by cuttings, which should be kept a week in the stove before they are planted, that the part cut may have time to heal. They will take root in about six weeks, if planted in small pots plunged in a moderate hot bed, and not over watered. They may then be planted separately in similar pots, filled with light sandy earth; and may be plunged again into the hot-bed, till they have taken fresh root, when they should be removed to the dry stove, where they must constantly remain, being allowed but little water in winter, and a large share of fresh air in the warm days of summer.

CASSYTA poly sperma, Hort. Kew. See RHIPSALIS.

CAST, a term in *Sculpture*, for the impression of any figure taken in bronze, plaster, wax, or other fusible material. The original of this word is kaster, Danish, a throw, because the fused matter is thrown on the figure of which the impression is to be taken. The process is as follows: plaster of Paris is mixed with water in a basin or pan, and stirred with a spatula until its consistence is like that of batter for pancakes; it is then poured on any figure, for instance, a human hand, or foot, previously greased or oiled in the slightest manner possible, which will prevent the adhesion of the plaster: after a few minutes the plaster will dry to the hardness of soft stone, taking the exact impression of every part, even the minutest pores of the skin. This impression, the reverse or hollow of the original subject (like a seal in comparison with its impression), is called the mould, which being taken off from the figure that produced it, must be slightly greased, and then plaster, mixed with water as before, may be poured into this first impression or mould, and remaining until it is hardened, and then relieved, or taken from the mould, is the exact image of the original figure. If the figure is flat, having no deep hollows or high projections, it may be moulded in one piece; if its surface is varied with great hollows and projections, it must be moulded in many pieces fitted together, and held in one or more outside or containing pieces. Pliny mentions casting faces from nature in the early practice of Greek sculpture. This useful art supplies the painter and sculptor with exact representations from nature of limbs, bodies, heads of men and inferior animals, anatomical subjects, draperies, and plants; it multiplies models of all kinds, and is now practised in such perfection, that casts of the antique statues are made so precisely like the originals in proportion, outline, and surface, that no difference whatever is discoverable, excepting in colour and materials. See BRONZE and BRONZE casting.

CAST, among *Wax Chandlers*, denotes a ladleful of melted wax, poured on the wicks of candles made by the ladle.

CAST, among *Founders*, is applied to tubes of wax, fitted in divers parts of a mould of the same matter, by means of which, when the wax of the mould is removed, the melted metal is conveyed into all the parts which the wax before possessed.

CAST, among *Bowlers*. See BOWLING.

CAST also denotes a cylindrical piece of brass, or copper, slit in two, lengthwise, used by the founders in sand to form a canal or conduit in their moulds, whereby the metal may be conveyed to the different pieces intended to be cast.

CAST, among *Plumbers*, denotes a little brazen funnel, at one end of a mould, for casting pipes without folding, by means of which the metal melted is poured into the mould.

CAST of the country, with *Miners*, the colour of the earth.

CAST, in *Falconry*, denotes a fet or couple of hawks.

To cast a hawk to the perch, signifies to set her upon it.

CAST, in *Rural Economy*, a term applied to some kinds of insects. Thus a cast of bees signifies a swarm or flight of bees. See BEES.—Also, a word sometimes applied to poultry, when they lose their feathers, or moult. It is also applied to the changing of the hair and hoofs of horses. Horses cast or shed their hair at least once in a year. Every spring they cast the winter coat, and take a summer one; and sometimes in the end of autumn they put on their winter hair, in case they have been ill fed, farried, or clothed, or kept in a cold stable. Sometimes they cast likewise their hoofs; when this happens, they should be turned out into a pasture for some length of time.

CAST, among the *Hindoos*, denotes a tribe, or number of families of the same rank and profession; and this division, which is ancient and peculiar, has very generally prevailed in India. This distribution seems to have proceeded from a crafty priesthood in order to fix their own superiority or preponderance. Prior, says Dr. Robertson, (*Hist. Disq. concerning India*, p. 231) to the records of authentic history, and even before the most remote æra to which their own traditions pretend to reach, this separation of professions had not only taken place among the natives of India, but the perpetuity of it was secured by an institution which must be considered as the fundamental article in the system of their policy. The whole body of the people was divided into four orders or casts. According to all the writers of antiquity, indeed, the Indians are said to be divided into seven tribes or casts. See Strabo, l. xv. p. 1029. Diod. Sicul. lib. ii. p. 153. Arrian, *Indic. c.* 10. But they were probably led into this error by considering some of the subdivisions of the casts, as if they had been a distinct independent order. However, from the concurrent testimony of the best informed modern travellers, we learn, that there were no more than four original casts. In a work entitled, “*La Porte Ouverte, ou la vraie Representation de la Vie, des Mœurs, de la Religion, et du Service des Bramines, qui demeurent sur les Côtes de Choromandel, &c.*” compiled before the middle of the 17th century, by Abraham Roger, chaplain of the Dutch factory at Pullicate, we have a distinct account of these casts. No doubt can now be entertained with respect either to the number or the functions of the casts, as both are ascertained from the most ancient and sacred books of the *Hindoos*, and confirmed by the accounts of their own institutions, given by Brahmins eminent for their learning. According to them, the different casts proceeded from Brahma, the immediate agent of the creation under the Supreme Power, in such a manner as to establish both the rank which they were to hold, and the office which they were required to perform; so that to mingle or confound them would be deemed an act of the most daring impiety.

The members of the first cast, called the *brahmins*, from the mouth (wisdom), and deemed the most sacred, had it for their province, to pray, to read, to instruct, to study the principles of religion, to perform its functions, and to cultivate the sciences. They were the priests, the instructors, and philosophers of the nation. The members of the second order, called *Chehterees*, from the arms (strength); to draw the bow, to fight, to govern; were entrusted with the government and defence of the state. In peace they were its rulers and magistrates; in war they were the generals who commanded its armies, and the soldiers who fought its battles. The third order, called the *Bice*, from the belly and thighs (nourishment); to provide the necessaries of life by agriculture and traffic; was composed of husbandmen and merchants. The fourth cast denominated the *Sooder* from the feet (subjection); to labour, to serve; consisted of artisans, labourers, and servants. Subordinate to these casts is a fifth, or adventitious class, denominated *Burrin Sunker*, supposed to be the offspring of an illicit union between persons of different casts. These are mostly dealers in petty articles of retail trade. (See preface to the code of Gentoo laws, p. 46 and 99.) This adventitious cast is not mentioned, as Dr. Robertson supposes, by any European author. The distinction was too nice to be observed by them, and they seem to consider the members of this cast as belonging to the *Sooder*. Besides these acknowledged casts, there is a race of unhappy men, denominated on the Coromandel coast *Pariahs*, and, in other parts of India, *Chandalas*. These are outcasts from their original order, who, by their misconduct, have for-

feited all the privileges of it. Their condition is, without doubt, the lowest degradation of human nature. If a *Pariah* approach a *Nayr*, i. e. a warrior of high cast, on the Malabar coast, he may put him to death with impunity. Water and milk are considered as defiled even by their shadow passing over them, and cannot be used until they are purified. (Ayeen Akbery, vol. iii. p. 243.) Every Hindoo who violates the rules or institutions of his cast sinks into this degraded situation. Hence it is that the *Hindoos* so resolutely adhere to the institutions of their tribe, because the loss of cast is, to them, the loss of all human comfort and respectability; and is a punishment, beyond comparison, more severe than excommunication in the most triumphant period of Papal power.

The four original casts are named, and their functions described in the “*Mahabarat*,” the most ancient book of the *Hindoos*, and of higher authority than any with which Europeans are hitherto acquainted. Baghivat-Geeta, p. 130. The same distinction of casts was known to the author of Heeto-pades, another work of considerable antiquity translated from the Sanskreet, p. 251.

The members of one cast can never quit his own, or be admitted into another; so that the station of every individual is unalterably fixed, his destiny is irrevocable, and the walk of life is marked out, from which he must never deviate. Moreover, the members of each cast adhere invariably to the profession of their forefathers; and from generation to generation, the same families have followed, and will always continue to follow, one uniform line of life. However, though the line of separation be so drawn as to render the ascent from an inferior to a higher cast absolutely impossible, and it would be regarded as a most enormous impiety if one in a lower order should presume to perform any function belonging to those of a superior cast; yet, in certain cases, the Pundits declare it to be lawful for persons of a high class to exercise some of the occupations allotted to a class below their own, without losing their cast by doing so. Pref. of Pundits to the Code of Gentoo Laws, p. 100. Accordingly we find Brahmins employed in the service of their princes, not only as ministers of state (Orme’s *Fragments*, p. 207), but in subordinate stations. Many officers of the army, particularly in the Mahratta states, have been Brahmins; and many seapoys in the service of the East India company, especially in the Bengal presidency, are of the Brahmin cast. Another fact concerning the casts deserves notice. An immense number of pilgrims, amounting in some years, to more than 150,000, visit the pagoda of Jaggernaut in Orissa, one of the most ancient and revered places of Hindoo worship, at the time of the annual festival in honour of the deity to whom the temple is consecrated. The members of all the four casts are allowed promiscuously to approach the altar of the idol, and seating themselves without distinction, eat indiscriminately of the same food. This seems to indicate some remembrance of a state prior to the institution of casts, when all men were considered as equal.

Such arbitrary arrangements of the various members, composing a community seem, at first view, to be adverse to improvement either in science or arts, and the artificial barriers that separate different orders of men tend to circumscribe the operations of the human mind within a narrower sphere than nature has allotted to them. Hence genius must sometimes be checked in its career, and talents fitted to shine in an higher sphere be confined to the functions of an inferior cast. Nevertheless, these arrangements of Indian policy are adapted to the general state of society, though they may be attended with partial inconvenience; and they serve to accomplish the object of the first Indian legislators, which

was to employ the most effectual means of providing for the subsistence, the security, and the happiness of all the members of the community over which they presided. With this view they set apart certain races of men for each of the various professions and arts necessary in a well-ordered society, and appointed the exercise of them to be transmitted from father to son in succession. This system, though repugnant to the ideas which we, who are placed in a very different state of society, may have formed, are better adapted to the attainment of the end proposed, than a careless observer is apt to imagine. An Indian, on his entrance into life, knows the station which he is destined to occupy, and the functions which he is to perform; and from his earliest years, he is trained to the habit of doing, with ease and pleasure, that which he must continue to do through life. To this may be ascribed that high degree of perfection conspicuous in many of the Indian manufactures; and though veneration for the practices of their ancestors may check the spirit of invention, yet, by adhering to these, they acquire such an expertness and delicacy of hand, that Europeans, with all the advantages of superior science, and the aid of more complete instruments, have never been able to equal the exquisite execution of their workmanship. To this early division of the people into casts, we must likewise ascribe a striking peculiarity in the state of India; the permanence of its institutions, and the immutability in the manners of its inhabitants. What now is in India, says Dr. Robertson, always was there; and is likely still to continue; neither the ferocious violence and illiberal fanaticism of its Mahomedan conquerors, nor the power of its European masters, have effected any considerable alteration. The same distinctions take place, the same arrangements in civil and domestic society remain, the same maxims of religion are held in veneration, and the same sciences and arts are cultivated; and hence, in all ages, the trade in India has been the same. This ingenious writer adduces the division into casts as one evidence of the ancient and high civilization of the Hindoos. But it has been observed by Mr. Pinkerton, (see *Mod. Geog.* vol. ii. p. 259.) that the error of his argument consists in his confounding casts with trades, while in reality they are totally distinct, as neither a priest, a soldier, a farmer, nor a labourer is a tradesman. Separation of trades argues refinement; but from the Hindoo casts nothing can be concluded, except that agriculture existed at their institution. Besides, when he adds that "what now is in India, always was there," he evinces rather a singular love of hypothesis. All we know from antiquity is, that the casts existed in the time of Strabo, Arrian, and Ptolemy, and perhaps were not known even in the time of Alexander. If we suppose that they existed three centuries before the Christian æra, we have only a proof that agriculture and merchandize were then known in Hindoostan; and yet the first tribe that passed from the centre of Asia might, even in that case, have only begun to people the north of Hindoostan a few centuries, or a thousand years before the Christian æra. Among the followers of Bouddha or BOODH, in the Birman empire, and in Siam, the distinction of casts is utterly unknown. Dr. Buchanan (*Asiatic Researches*, vol. vi. p. 251.) in tracing the origin of the doctrine of cast established in Hindoostan, refers to Pliny, (N. H. l. xi. c. 19.) who mentions a division of ranks among various Indian nations, which he calls "vita multipartita;" but from what he says, it does not appear to have been universal at the time he received his intelligence; neither is it by any means clear, that his "vita multipartita" means cast. It is to be observed, that all Roman citizens followed nearly the same

mode of life; they were soldiers and statesmen; and when not employed in either of these capacities, they were all cultivators of the land. To them, therefore, a distinction of professions among the citizens of a state would appear strange; and hence this writer inclines to think, that the "vita multipartita" of Pliny more resembles the division of ranks and professions among the Burmas, or in modern Europe, than it does the cast of the Brahmins. The description of Pliny, in the passage above referred to, neither agrees with the present divisions of the different casts, nor does it call the learned Brahmins; on the contrary, Pliny speaks of the Brachmanæ not as a class and order in society, but as a nation, and as a name common to many nations. He mentions, that Seneca had attempted to procure the names of all the people inhabiting India, and had actually heard of 118 nations. The most considerable of these he afterwards enumerates, lib. vi. c. 17. See *BIRMAN Empire*, *BOODH*, *BRAHMINS*, and *HINDOOS*.

CAST-away, in *Sea Language*, the state of a ship which is lost or wrecked on a lee shore, bank, or shallow.

CASTABALA, in *Ancient Geography*, a town of Asia, in Cilicia Propria, according to Ptolemy, who places it in the neighbourhood of Mopsuestia. In the Itinerary of Antonine it is in the route from Constantinople to Antioch. M. d'Anville places it at a very small distance to the north-west of Issus.—Also, a town of Asia Minor, in Cappadocia, placed by Strabo near the mountains, who says that it had a temple of Diana Perasia. M. d'Anville places it at the source of a river which discharged itself into the Halys. It was at some distance E. of Cybistra.

CASTABUENA, in *Geography*, a town of Istria; six miles S. of Capo d'Istria.

CASTACIUS SINUS, in *Ancient Geography*, a gulf of Asia Minor, on the Thracian Bosphorus, S. of the gulf *Cydaminus*.

CASTAGNEUX, in *Ornithology*, a name given to a species of *COLUMBUS*, which see.

CASTAGNO, ANDREA, DAL, in *Biography*, an eminent historical painter, was born at a small village called Castagno, belonging to Tuscany, in 1409, and being deprived of his parents when young, was employed by his uncle to attend the herds of cattle in the fields. His singular talents, which were first manifested in surprising efforts to imitate an ordinary painter, whom he accidentally observed at work, became the common topic of discourse in Florence, and excited the curiosity of Bernardetto de Medici; so that he placed him under the tuition of the best masters at that time in Florence. Andrea, assiduously improving his advantages, became particularly eminent in design, and found full employment. At first he painted only in distemper and fresco; but at length he learned the secret of painting in oil from Domenico Venetiano, who had derived his knowledge of it from Antonella da Messina. He was the first of the Florentine artists who painted in oil; but envying the merit of Domenico, from whom he obtained the secret, he determined, with the basest ingratitude, to assassinate his friend and benefactor. At this time Domenico and Andrea lived together, and were partners in business. Insensible, however, of every obligation, and combining treachery with ingratitude, he way-laid Domenico in the corner of a street, and stabbed him with such secrecy, that he escaped unobserved and unsuspected to his own house, where he sat down with apparent composure to work; soon after Domenico was conveyed thither to die in the arms of his assassin. The real author of this atrocious act was never discovered, till Andrea, through remorse of conscience, disclosed it on his death-bed, in 1460. Andrea finished several considerable works at Florence, by which he gained great wealth.

wealth and reputation; but as soon as his complicated villainy became public, his memory was afterwards held in the utmost detestation. The most noted of his works is in the hall of justice at Florence, and represents the execution of the conspirators against the house of Medici. Pilkington.

CASTAGNOLA, in *Geography*, a town of Piedmont, on the Po; 8 miles S. of Turin.

CASTAGNOLE, in *Ichthyology*, a name given by the Italians to the fish called by the generality of authors CHROMIS, which see.

CASTALDI, CORNELIO, in *Biography*, the descendant of a noble family, was born at Feltri about the year 1480, and though educated to the bar, he devoted himself to poetry and the study of polite literature. On his marriage he settled at Padua, where he founded a college, and gained universal esteem. He died in 1536. His poems were both Italian and Latin. The former contain ingenious and elevated sentiments, but are defective in sweetness and elegance of style. The latter are a happy imitation of the ancients. They were published at Venice, in 4to. in 1757, by the abbé Conti, with a life of the author prefixed by Signor Farsetti. Nouv. Dict. Hist.

CASTALDUS. }
CASTALDY. } See GASTALDUS.

CASTALIA, in *Botany* (so called quia uterum totum, quasi ob pudicitiam, occultent species hujus generis) Salisbury Annal. of Botany, vol. ii. p. 71. Paradis. Lond. 14. (Nymphæa, Linn.) Class and ord. *Polyandria monogynia*. Nat. ord. *Hydrocharitides*, Juss. *Nymphæa*, Salis.

Gen. Ch. *Cal.* perianth four or five-leaved, surrounding the margin of the receptacle. *Cor.* petals from twenty to thirty, inserted into the pericarp from the base to the middle. *Stam.* filaments from sixty to a hundred and fifty, inserted into the pericarp above the petals, free. *Pist.* style none; stigma with as many rays as there are cells in the fruit. *Peric.* from twelve to twenty-celled, putrefying as the seeds ripen. *Ned.* one, in the centre of the stigma, globular. *Seeds* from two to three hundred, sessile on the inner side of the pericarp, surrounded with a follicle.

Flowers white, red, or blue, rivaling the magnolias. It differs from the proper nymphæa in the insertion of the petals and stamens into the pericarp, and not into the receptacle. We have adopted Mr. Salisbury's generic name, from a confirmed unwillingness to change any name once given, unless urged to it by the most cogent reasons; but, at the same time, we feel ourselves constrained to add, that we cannot concur with that excellent botanist in the principle on which he has been induced to choose it. Every attempt to extend the sexual analogy between plants and animals to the mode of operation and its essential circumstances, appears to us to be no less adverse to philosophical precision and truth, than it assuredly is to moral purity, and to that delicacy of decorum, which is one of the best characters of a rightly cultivated mind.

* *Leaves with a fissure extending to the petiole.*

Sp. 1. *C. odorata*. (*C. pudica*, Salis. *Nymphæa odorata*, Hort. Kew. Bot. Rep. pl. 297. "Lobes of the leaves divaricated, acuminate; receptacle shaped like the nave of a wheel." (*Medioliformis*, Salis. So the word is spelt both in the Annals of Botany, and in Paradisus Londinensis, but as we are not acquainted with such a Latin word, we presume it should be *modioliformis*, which means either a small concave measure, or the nave of a wheel.) A native of Virginia. The flowers diffuse a spicy odour, somewhat resembling aniseed. 2. *C. alba*, white water-lily. (*C. speciosa*, Salisb. *Nymphæa alba*, Linn. Eng. Bot. pl. 160.) "Lobes of the leaves approximate, scarcely acuminate; receptacle

cymbal-shaped." *Calyx-leaves* four, oblong, green underneath, white above, often tinged at the base with a light bluish-colour. *Petals* white, lanceolate, in several rows, gradually lessening in size. *Stamens* yellow; outer ones dilated, resembling petals, with only the rudiments of an anther. *Fruit* scarred with the marks of the fallen petals and stamens. A native of various parts of Great Britain; in ponds and slow streams.

** *Leaves peltate.*

3. *C. Lotus*, (*C. mystica*, Salisb. Parad. Lond. 14. *Nymphæa lotus*, Bot. Mag. pl. 729. Plant. Rar. Hung. vol. i. fig. 15. Willd. Sp. Pl. Savign. in Ann. du Mus. vol. i. p. 336. Hasselq. Ref. p. 471. *Lotus*, Alp. Exot. p. 214. with a figure.) "Leaves nearly orbicular, sharply toothed, smooth on both sides; receptacle shaped like the nave of a wheel; inner petals very small." A native of Hungary in the warm waters near Peeze. Mr. Salisbury observes, that though he has followed other authors in quoting the above synonyms, he is not absolutely certain that the Hungarian plant from which his specific character is formed, is the same with the Egyptian lotus; for in that, Savigny says, the petioles are hispid: and, according to Hasselquist, the peduncles are perforated with only four large tubes; whereas the whole herb of the Hungarian plant is smooth, and the peduncles are perforated with six large tubes. The flowers have the brandy-like smell of *Nymphæa lutea*, continuing expanded till the evening. 4. *C. pubescens*. (*C. sacra*, Salisb. Parad. Lond. 14. *Nymphæa pubescens*, Willd. Sp. Pl. *Nymphæa lotus*, Marq. of Blandford, in Bot. Rep. fig. 391. Roxb. MSS. Aabel, Rheed. Mal. v. 11. fig. 26.) "Leaves oval, toothed, pubescent, and spotted underneath; petals white, rather unequal." The flowers have a pungent, vinous odour, but very different from that of the Hungarian lotus. A native of Hindoostan; in marshes. 5. *C. magnifica*, Salisb. Parad. Lond. 14. (*Nymphæa rubra*, Roxb. MSS.) "Leaves nearly orbicular, toothed, pubescent underneath, but not spotted; petals bright red, rather unequal." Flowers sometimes seven or eight inches in diameter, inodorous. A native of Hindoostan; in marshes. Dr. Roxburgh regards this and the foregoing as varieties, but Mr. Salisbury is inclined to keep them distinct. They are both sacred plants in Hindoostan, and expand in our climate from the very first twilight to about ten in the morning, after which they gradually close, and are quite shut at noon. 6. *C. edulis*, Salisb. (*Nymphæa coteka*, Roxb. MSS.) "Leaves broad-oval, quite entire, pubescent underneath; flowers small. A native of Hindoostan; in marshes. 7. *C. ampla*, Salisb. (*Nymphæa fulvis amplioribus*, &c. Brown Jam. p. 243.) "Leaves orbicular, sharply toothed, smooth on both sides, with very prominent nerves underneath; petals long; anthers lengthened at the tip. A native of La Vera Cruz. 8. *C. cærulea*. (*C. scutifolia*, Salisb. *Nymphæa cærulea*, Bot. Mag. pl. 552. Bot. Repos. pl. 197. N. flore cæruleo, Breyn. Prod. 2. p. 77.) "Leaves orbicular, more or less repand toothed, smooth on both sides; primary nerves numerous, slender; anthers lengthened at the tip." A native of the Cape of Good Hope, now become very common in the English fives. 9. *C. stellata*, (*C. stellaris*, Salisb. *Nymphæa stellata*, Willd. Sp. Pl. Bot. Rep. 330. *Nymphæa cærulea*, Juss. Malm. 6. Savign. Ann. du Mus. vol. i. p. 336. Citambel, Rheed. Mal. vol. ii. p. 52. pl. 26.) "Leaves orbicular, quite entire, smooth on both sides; primary nerves few, but little prominent underneath; rays of the stigma very short." A native of Egypt and Hindoostan, and Mr. Salisbury believes it to be the plant of New Holland, found by sir Joseph Banks in Endeavour river.

CASTALIA, in *Entomology*, a species of PHALÆNA, (*Bombyx*), found in New Holland.

CASTALIA,

CASTALIA, in *Ancient Geography*, a fountain of Asia, in the suburbs of Daphne, near the city of Antioch in Syria. Sozomen says that the Pagans believed, that the water of this fountain communicated to those who drank it a knowledge of futurity, and thus produced an effect similar to that at Delphi. The oracle at this fountain is said to have promised Adrian, when he was in a private station, the future possession of sovereign power. Jealous of that distinguishing favour, and fearing lest others should obtain the like, and avail themselves of it, as he had done, he ordered, on his ascent to the throne, this fountain to be shut up with stones.

CASTALIA, a river that runs at the foot of mount Parnassus, sacred to the Muses, hence called *Castalides*, the murmurs of which were thought to be prophetic. Upon the banks of this river the Pythian games were celebrated. Pindar refers to it in a verse of his 7th Olympic ode, thus rendered by West (vol. i. p. 58):

“Where sweet Castalia’s mystic currents sound.”

CASTALIA, or *Castalios fons*, a fountain which discharged its water between the summits of Parnassus. This water inspired those who drank it with poetic enthusiasm. M. Spon, in his Voyage into Greece, says, that the waters of this fountain flowed from the declivity of a rock, where they produced fine cascades. They passed near Delphi, and on this account, Phavorinus says, *Κασταλία κρηνη εν Πύλωνι*. See DELPHI and PARNASSUS.

CASTALIO, or **CASTELLIO**, SEBASTIAN, whose proper name was *Chateillon*, in *Biography*, was born in 1515, in the mountainous district of Dauphiné, or, as some say, of Savoy. Although nothing certain is known concerning his education, he appears to have obtained the esteem of Calvin, by his acquaintance with the ancient languages, when he was introduced to that reformer at Strasburg, in 1540 and 1541. On his recommendation he was appointed teacher in the college of Geneva; but the intolerant temper of Calvin obliged him to leave this situation, after having occupied it about three years. He disagreed with Calvin with regard to the doctrine of predestination; he disapproved of the civil punishment of heretics; he considered the Canticles of Solomon as a profane piece; he entertained an opinion peculiar to himself concerning Christ’s descent into hell; and he was suspected of having imbibed some of the sentiments of the Anabaptists. Such were the offences for which he was expelled Geneva, and became an object of the persecution both of Calvin and Beza. At Basil, whither he removed, he obtained the professorship of the Greek language; but having a large family, and his circumstances being indigent, he found it very difficult to procure for them a subsistence, and to prosecute the studies to which he was devoted. Calvin, who could not be ignorant of his distressed situation, but who seems to have felt no compassion for him, accused him of stealing wood. Castalio’s own relation of the fact is as follows: “Being totally occupied with my translation of the Scripture, and resolved rather to beg than to quit it, as I dwelt on the banks of the Rhine, I employed myself at leisure hours in catching with a hook the floating wood which was brought down the stream by its inundations, that I might warm my family. This wood is public property, and belongs to him that first takes it.” He appeals to the whole city of Basil for the truth of his narration, and concludes with thus addressing the unsympathizing Calvin; “I could not have thought that you, you who knew me, could have credited such a charge; but that you should publish it to the whole world, and transmit it to posterity, is what (although I know you) I could not easily have believed!” The consistory at Basil would not allow him to publish his works in that city

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without animadversion; he was cited before them; and the curators of the university wished to restrain him from theological topics. But whilst his opinions met with no indulgence, he was so much esteemed for his piety and learning, that his enemies were not able to expel him. However he peaceably closed his life of anxiety and indigence at Basil, in 1563, at the early age of 48 years. Castalio was an elegant, though not a profound scholar; and his Latinity resembles that of the modern Italian schools. In 1545 he printed at Basil four books of Scripture-histories in elegant Latin, with a view of communicating to children a knowledge of the facts of their religion, and at the same time of giving them a taste for polite literature. In 1546 he published a poetical translation of the Sibylline verses, with notes, together with a prose version of the books of Moses, which was followed by a translation of David’s Psalms, and the other Scripture songs. In 1548 he published a Greek poem on John the Baptist, and a Latin poetical paraphrase of the prophet Jonas. He likewise translated some parts of Homer, some books of Xenophon, and St. Cyril. His translation of some Italian treatises of Ochinus, and particularly his “Thirty Dialogues,” favouring polygamy, furnished one ground of the accusations against him. But his greatest work was his Latin translation of the Bible, for an account of which see *Latin Bibles*. This version was the most elegant and classical that was ever made; but whilst it has been highly commended by some, it has been censured by others for an affected use of terms, not properly belonging to Jewish or Christian theology, and for an improper and paraphractical deviation from the original phraseology. His “New Testament,” however, is read with pleasure, and very properly put into the hands of young scholars. It is no improbable conjecture, that the hostility of Beza against him might have been partly owing to the rivalry of his version. Castalio’s French translation of the Bible (see *French Bibles*), dedicated to Henry II. of France, and printed at Basil in 1555, has been charged with the adoption of a low and vulgar phraseology. Bayle in Gen. Dict.

CASTALOGNE, or **CASTELOGNE**, a coverlid made of fine wool, on the weaver’s loom.

CASTAMENA, or **KASTAMONI**, in *Geography*, a town of Asiatic Turkey, in the province of Natolia, formerly a large and flourishing city, and the see of a Greek archbishop, but now much reduced in size and magnificence; 240 miles east of Constantinople. N. lat. 44° 42′. E. long. 34° 22′.

CASTANEA, in *Botany*, Tourn. Gært. Vent. See *FAGUS castanea*.

CASTANEA æquina, Ray. See *ÆSCULUS Hippo-castanum*.

CASTANEA, in *Entomology*, a species of *Chermes*, which see.

CASTANEA, in *Natural History*, a species of *Turbo*, and also of *Helix*, which see respectively.

CASTANET, in *Geography*, a town of France, in the department of the Upper Garonne, and chief place of a canton in the district of Toulouse, 2 leagues S.S.E. of Toulouse. The place contains 1320, and the canton 6339, inhabitants; the territory includes 107½ kilometres and 16 communes.

CASTANETS, **CASTAGNETTES**, or **CASTANETTAS**, small musical instruments of percussion, in pairs, with which the Moors, Spaniards, and Bohemians mark the measures and steps in their dances, holding two in each hand. They consist of two little round pieces of dried wood, and hollowed in the manner of spoons, of which the concavities are placed over each other, fastened to the thumb, and beat from time to time with the middle finger, to mark the steps and gestures.

5 F

Each

Each *castanet* is kept in its place by a string passing through a hole pierced through an eminence left for that purpose at the side of the castanet, and which serves as a neck.

There is a notation for castanets to mark the time, and the two hands ought at least to have as many characters as there are notes in a bar. Dextrous performers will double and triple the notes assigned them.

The tablature for the castanets is marked with the usual characters of the time-table, placed above and below the same staff or line; those above for the left hand, and those below for the right. The bars, whether a single line or a five line staff, are to be marked by a perpendicular line. There ought likewise to be a clef, and a character for time at the beginning of each tune.

This article is taken from the new *Encycl. Meth.*; but we are unable to discover the use of clefs for a monotonous instrument, or rather for an instrument on which no tuneable sound can be produced.

CASTANETTO, in *Geography*, a town of the island of Corsica; 13 miles N.E. of Corte.

CASTANHEIRA, a town of Portugal, in the province of Estramadura; 6 leagues N.E. of Lisbon.—Also, a town of Portugal, in the same province; 8 leagues E.S.E. of Coimbra.—Also, a town of Portugal, in the province of Beira; 2½ leagues E. of Aveiro.

CASTANIA, in *Ancient Geography*, a town of Italy, near Tarentum; supposed to be that which is now called *Castellaneta*.

CASTANOVITZ, in *Geography*, a town of Croatia, seated on the river Unna, and subject to the house of Austria. N. lat. 45° 40'. E. long. 17° 20'.

CASTAX, in *Ancient Geography*, a town of Spain, mentioned by Appian, and supposed to be the same with the *Castalon* of Livy.

CASTEL, **LOUIS BERTRAND**, in *Biography*, a geometer and philosopher, born at Montpellier in 1688, and who entered into the society of Jesus in 1703. He made himself known to Fontenelle and to father Tournemine by his essays and sketches of new invention, which promised the greatest success. The young man was at this time in Provence, but was invited to the capital. Castel removed from Thoulouse to Paris in 1720. He supported the idea of his talents which his essays had excited. The first work he published was his "Treatise on Universal Gravitation," in 2 vols. 12mo. 1724. All nature, according to him, depends on two principles, the weight of bodies and their tendency to motion; the one, which incessantly precipitates them to repose, the other, which re-establishes their motion. This doctrine, the key of the system of the universe, as he pretended, did not satisfy the abbé de saint Pierre. Though a friend of the mathematician, he attacked him; the Jesuit answered. The writings on both sides manifested a considerable portion of wit and ingenuity in the combatants, but it was of a singular kind. The second work of father Castel was his "Plan for an Abridgment of the Mathematics," Paris, 1727, in 4to. which was soon followed by a "Universal Mathematic," 1728, 4to. This work was applauded both in England and France, and the Royal Society of London opened its doors to the author. Dict. Hist.

His "Clavecin Oculaire," or ocular harpsichord, though silent, made a considerable noise in the world, and excited much curiosity and considerable expectation among opticians as well as musicians. His idea of producing the same pleasure to the eye by the melody and harmony of colours, as the ear received from the succession and combination of musical tones, was published in 1725. Sir Isaac Newton, having discovered (Optics, book i. p. 2. prop. 3.) that the

breadths of the seven primary colours in the sun's image, produced, by the refraction of his rays through a prism, are proportional to the seven differences of the lengths of the eight musical strings, D, E, F, G, A, B, C, D, when the intervals of their sounds are T, H, t, T, t, T, t, H: which order is remarkably regular. Smith's Harmonies. From this analogy, Pere Castel sets off by telling us that there is a fundamental and primitive sound in nature to which we may give the name of *ret*, or C.

There is also a primitive and original tone which serves for base and fundamental to all colours, which is blue.

There are three essential sounds which depend on this primitive tone of C, and which together compose the perfect, primitive, and original chord, which is CEG.

There are likewise three original colours dependent on the blue; they are compounded of no other colours, and they produce the rest; these three colours are blue, yellow, and red. The blue is the key-note, the red the fifth, and the yellow the third. There are five tones, C, D, E, G, A; and two semi-tones, F and C. In the same manner there are five principal colours, blue, green, yellow, red, and violet; and two semi-tone colours, which are orange and indigo.

The musical scales, c, d, e, f, g, a, b. The scale of colours is blue, green, yellow, orange, red, and violet. These are the data of father Castel, upon which he has founded his organ or harpsichord of colours.

It would be useless to analyse and critically examine his plan, which is truly visionary, false in its ratios, and incapable of producing the promised effects.

After being tried in all parts of Europe, particularly in London, about the year 1756, when the plan and pretended effects were published in an English pamphlet,—but its exhibition was soon neglected and forgotten, and has been scarcely heard of since:—he died in 1767, leaving behind him the character of a visionary projector, whose eccentricities, though wild, were innocent; and if he did not instruct mankind, he contributed to their idle amusements.

Pere Castel was the dupe of a fertile and lively imagination. His systems were at first mere hypotheses; but he cherished them so long, that, by degrees, he fancied he had realized them. "The New general System of Nature," by Newton, in 1743, in 4to. did him more honour, but it displeased others. He respected the English philosopher, without allowing his doctrine to be the true system of the world. "Newton and Descartes," says he, "have infinite merit for their invention. The latter had more facility; and elevation, the former less facility and more depth; which is nearly the character of the two nations; the French build loftily, the English profoundly. Both were ambitious of framing a world, as Alexander was of conquering it; and both saw nature on a large scale." Castel wrote much in the "Memoirs de Trevoux;" he treated an infinite number of subjects, but none deeply. However, "he thought (says his biographer,) a great deal, and often well."

CASTEL, in *Geography*, a town of Germany, in the duchy of Carniola; 13 miles S.S.W. of Gottschee.—Also, a town of Germany, in the circle of Bavaria, and Upper Palatinate; 10 miles S.W. of Amberg.

CASTEL de las Guardas, a town of Spain, in the province of Andalusia; 8 leagues from Seville.

CASTEL Belforte, a town of Germany, in the country of Tyrol; 11 miles N.N.W. of Trent.

CASTEL-Branco, a town of Portugal, in the province of Beira; encompassed by a double wall, flanked with seven towers, and defended by an old castle; containing two churches, two hospitals, a poor-house, two convents, and

3,700 inhabitants. It is situated between the two rivers Poul and Vereza, which run into the Tagus, and distant 18 leagues S.E. from Coimbra. N. lat. $39^{\circ} 35'$. W. long. $8^{\circ} 0'$.

CASTEL-Franc, a town of France, in the department of the Lot; 1 league N.W. of Luzech.

CASTEL-Franco, a town of the island of Candia, near the south coast; 16 miles S.S.W. of Retimo.—Also, a small but strongly fortified town on the frontier of the Bolognese in Italy.

CASTEL-Jaloux, a town of France, in the department of the Lot and Garonne, and principal place of a canton, in the district of Marmande, seated on the Avance; it carries on a considerable trade in honey, cattle, and wine; $7\frac{1}{2}$ leagues W.N.W. of Agen, and $3\frac{1}{2}$ S.W. of Tonneins; the place contains 1757, and the canton 6013 inhabitants; the territory includes 195 kilometres and 10 communes.

CASTEL-Leone, a small town of Italy, in the Cremonese; 15 miles N.N.W. of Cremona.

CASTEL-Melhar, a town of Portugal, in the province of Beira; 5 leagues N. of Pinhel.

CASTEL-Moron, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the district of Marmande; 3 leagues W. of Villeneuve d'Agen. The place contains 2011, and the canton 7425 inhabitants; the territory includes $152\frac{1}{2}$ kilometres and 9 communes.

CASTEL-Moron de Albert, a town of France, and seat of a tribunal, in the department of the Gironde; 9 leagues S.E. of Bourdeaux.

CASTEL-Nova, a town of Portugal, in the province of Beira; 3 leagues N. of Castel-Branco.

CASTEL-Rapani, a town of European Turkey, in the Morea; 32 miles S.S.E. of Mistra.

CASTEL-Rodrigo, a town of Portugal, in the province of Beira; $3\frac{1}{2}$ leagues N.W. of Pinhel.

CASTEL-Rosso, an island in the Mediterranean, near the coast of Caramania, about a league in length. It has a large village, inhabited by Greeks, and defended by a castle; on the south side it has a good harbour; 90 miles E. of Rhodes. N. lat. $36^{\circ} 7'$. E. long. $29^{\circ} 31'$.

CASTEL-Rosso. See CARISTO.

CASTEL-Sagrat, a town of France, in the department of the Lot and Garonne; 6 leagues E. of Agen.

CASTEL-Sarrazin, a town of France, in the department of the Upper Garonne, and chief place of a district; 10 leagues N.N.W. of Toulouse. The place contains 7,000, and the canton 10,696 inhabitants; the territory includes $152\frac{1}{2}$ kilometres and 7 communes.

CASTEL St. Pietro, a town of Germany, in the country of Tyrol; 12 miles S.S.W. of Bolzano.

CASTEL-Selino, a town of the island of Candia, on the south coast, near the western extremity; 21 miles S.W. of Canea.

CASTEL-Tornese, a town of European Turkey, in the Morea, seated on an eminence, near the sea, and defended with a castle; 10 miles S. of Chiarenza.

CASTEL-Ubaldo, a town of Asiatic Turkey, in the province of Caramania; two miles S.W. of Alameh.

CASTELANZA, a town of Italy, in the Milanese; 14 miles N.W. of Milan.

CASTELBONIFACIO, a town of European Turkey, in the island of Candia; 12 miles S.S.W. of Candia.

CASTELHOLM, a town of Sweden, in the island of Aland. This place is famous for the ruins of an ancient palace, seated on an insulated rock of red granite, and built with red granite and brick, which commands a pleasing, though bounded, prospect of two small lakes, whose banks rise into

gentle eminences skirted with wood. To this solitary rock Eric XIV. was, in 1571, confined by his brother John III.; and the dungeon, in which he was imprisoned, still bears the name of the apartment of Eric.

CASTELLA, in Botany, Cavan. Icon. 583. Class and ord. *Didymia gymnospermia*.

Gen. Ch. Cal. perianth tubular, permanent, with five furrows and five teeth. Cor. monopetalous, bilabiate; tube curved, longer than the calyx; upper lip upright, bifid; lower lip trifid; lobes obtuse. Stam. four; two longer. Pist. germ superior; style curved at its summit; stigma transversely oval. Peric. the enlarged calyx enclosing two nuts; nuts two-celled, with two envelopes, the inner one thin and red. Seeds oblong, cylindrical, one in each cell.

The only known species is a native of Brazil. Root annual. Stem four-sided, smooth. Leaves opposite, petioled, oval-wedge-shaped; upper ones toothed; lower ones crenulate. Flowers reddish, in terminal racemes; bracts lanceolate.

CASTELL, EDMUND, in Biography, a learned divine, was born in 1606 at Hatley, in the county of Cambridge, and educated at Emanuel college in the university of Cambridge, whence, after a residence of many years, he removed to St. John's college for the benefit of its library. The great work which engaged his chief attention for 17 years, and, as he says, cost him almost the incredible sum of 12000l., was his "Lexicon Heptaglotton," or Dictionary of seven tongues. After expending upon it his whole fortune, and being thus reduced to great distress, he was appointed, in 1666, king's chaplain and Arabic professor at Cambridge, and presented to a prebend at Canterbury. His Lexicon was published in 1669, but most of the copies remained unfold. Besides some other preferments, the last that was conferred upon him was the rectory of Higham Gobion, in Bedfordshire. Among other ill-requited and unprofitable labours, he assisted Dr. Walton in his Polyglott Bible, for which he translated several books of the Old and New Testament, and diligently examined the eastern versions. At the restoration, he published a thin 4to. pamphlet to the honour of Charles II., containing copies of verses in all the languages of his Lexicon. He died at his rectory in 1685, and bequeathed all his MSS. to the university of Cambridge. About 500 copies of his Lexicon, which came into the possession of his niece and executrix, were consigned in an old house to the mercy of the rats, so that scarcely one complete volume was left.

CASTELL, county of, in Geography, a principality of Germany, in the circle of Franconia, situated between the bishopric of Wurzburg, the principality of Anhalt, the lordship of Limburg, and the county of Schwarzenburg: deriving its name from an ancient castle, which was destroyed by the peasants in 1525. It pays 18 florins for a Roman month, and is taxed at 18 rix-dollars 84 kreutzers.

CASTELLA, CASTLES, in British Antiquity, were one of the three kinds of fortifications that were built along the line of Severus's wall; the other two being denominated *stations* and *towers*. These castles were neither so large nor so strong as the stations, but much more numerous, being no fewer than 81. In shape and dimension they were exact squares of 66 feet every way. They were fortified on every side with thick and lofty walls, but without any ditch, except on the north side, on which the wall itself, raised much above its usual height, with the ditch adjoining it, formed the fortification. The castles were situated in the intervals between the stations, generally at the distance of about seven furlongs from one another; and guards were constantly

kept in them by a competent member of men detached from the nearest stations. *Horr. Brit. Rom.* p. 108.

CASTELLAIN, *Castellanus*, the lord, owner, or captain of a castle; and sometimes the constable of a fortified house. *Bract. lib. v. tract. 2. c. 16.* 3 *Edw. I. c. 7.* It has likewise been taken for him that hath the custody of one of the king's mansion-houses, called by the Lombards *curtes*, in English *courts*; though they are not castles or places of defence. 2. *Inst.* 31. And Manwood, in his *Forest Laws*, says there is an officer of the forest called *castellanus*.

CASTELLAN, in *Biography*. See **CHATEL**.

CASTELLAN, the name of a dignity or office in Poland. The castellans are senators of the kingdom, but senators of the lower class; and in diets, sit on low seats behind the palatines, or great senators. They are a kind of lieutenants of provinces, and command a part of a palatinate under the **PALATINE**. They are divided into grand and petty castellans: their office, in time of peace, is merely nominal; but when the military or feudal services are required, they are the lieutenants of the palatines, under whom they command the troops of the several districts.

CASTELLANA, *Civita*, in *Geography*, a town of Italy, between Otricoli and Rome, the first of ancient Latium, on the approach to Rome by the Flaminian way. This town is considered by many antiquarians as the Fecundum of the ancients. It stands upon a high rock, and must formerly have been a place of great strength, but it is now in no very flourishing condition.

CASTELLANE, in *Geography*, a town of France, and principal place of a district in the department of the Lower Alps, situate at the foot of a mountain, on the river Verdon, in a pleasant and fertile spot; 12 leagues W. of Nice. The place contains 1962 and the canton 4577 inhabitants; the territory includes 225 kilometres and 13 communes.

CASTELLANETTA, a town of Naples, in the province of Otranto, the see of a bishop, suffragan of Tarento; 18 miles E.S.E. of Matera.

CASTELLANI, in *Ancient Geography*, a people of Spain, who inhabited the Tarragonensis, to whom Ptolemy assigns four cities. They occupied a part of Catalonia at the foot of the Pyrenées.

CASTELLANIA, a Spanish word, derived from *Castello* or *Castile*, and denoting a separate territory, in the manner of a province, independent of any other; in which its particular laws are observed, and which has a jurisdiction over all the places dependent on its capital.

CASTELLANO, a town of Naples, in the province of Bari; eight miles S.W. of Monopoli.—Also, a town of Italy, in the Veronese, belonging to the state of Venice; 16 miles S.W. of Verona.

CASTELLANUS, or **Du CHATEL**, **HONORÉ**, in *Biography*, a native of Brabant, studied medicine at Montpellier, where he took his degree of doctor in 1544. Being soon distinguished for his learning, and abilities, he was sent for to Paris, and in succession filled the office of physician to Henry II., Francis II., and Charles IX. By his interest with Charles, he obtained a considerable addition to the salaries of the several professors of the university at Montpellier, which they have acknowledged by an inscription, in Latin, placed over the entrance into the college, the only memorial left of him, excepting an oration, on the excellence of the practice of physic, spoken on some occasion, not now known, and printed in 1555, 8vo. He died in November 1569, attending a part of the army of his sovereign to which he was also principal physician. *Eloy. Dict. Hist.*

CASTELLANUS, or **Du CHATEL**, **PETER**, was born at Grammont in Flanders in the year 1585. Shewing an early disposition to literature, he was sent to Mons, and afterwards to Orleans, where he acquired such a proficiency in the knowledge of the Greek language, that he was invited to Lovain, in 1609, to fill the chair of Greek professor, then vacant. In 1618, he took the degree of doctor in medicine. The same year he published at Antwerp, "*Vita illustrium Medicorum, qui toto orbe ad hæc usque tempora, floruerunt*," 12mo. It is a small volume, but the author has contrived, within that compass, to introduce the most striking passages in the lives of the more eminent physicians, who had flourished from the earliest period, to his time, with brief notices of their works. Although the accounts are taken almost entirely from other writers, whose words are frequently copied, yet the volume will always be esteemed, both as a monument of the learning, and diligence of the author, and for the perpetual references given to the sources from whence he obtained his information. He died in February 1632, aged only 47 years. *Haller. Bib. Med. Eloy. Dict. Hist.*

CASTELLANY, the district or extent of land under the jurisdiction of a lord castellan.

The province of Flanders is divided into so many castellanies, each of which bears the name of the capital; as the castellany of Lisle, of Ypres, of Ghent, &c. The court of castellany was anciently composed of the castellan, a fiscal, procurator, notary, register, &c. In Poland, a castellany is a petty government under the administration of a **CASTELLAN**.

CASTELLARIUS, the keeper, or curator, of a castellum. Gruter gives an ancient sepulchral inscription in memory of a *castellarius*.

CASTELLARO, in *Geography*, a town of Italy, in the duchy of Mantua; 10 miles E. of Mantua.—Also, a town in the state of Genoa; 11 miles N.E. of Vintimiglia.

CASTELLATION, *Castellatio*, in *Middle Age Writers*, the act of building a castle, or of fortifying a house, and rendering it a castle. By the ancient English laws, castellation was prohibited, without the king's especial licence. *Du Cange*.

CASTELLAUN, in *Geography*, a town of France, in the department of the Rhine and Moselle, and chief place of a canton, in the district of Simmern; 22 miles S.S.W. of Coblenz. The place contains 620 and the canton 4977 inhabitants: the territory includes 28 communes.

CASTELLENGO, a town of Italy, in the country of Vercelli; eight miles S.E. of Biella.

CASTELLI, **BENEDICT**, *Abbate*, in *Biography*, an eminent mathematician, was born of an ancient and noble family at Brescia, in the year 1577. In 1595, he entered into a monastery of the order of St. Benedict in his native city. He was for some time a disciple of Galileo at Florence, and assisted him in his astronomical observations, and afterwards maintained a regular correspondence with him. Under his name the apology of Galileo against the censures of Leodovico delle Colombe and Vincent di Grazia appeared, though it was principally written by Galileo himself. From 1615 to 1625, he occupied the mathematical chair at Pisa. In 1625, Castelli was invited to Rome by pope Urban VIII. and made mathematical professor in the college della Sapienza. The subject of his particular attention, and in the investigation of which he chiefly excelled, was the motion of water; and in 1628, he published two works upon it, which gained him much reputation; viz. "*The Mensuration of running Waters*," and "*Geometrical Demonstrations of the Mensuration of running Waters*." These

have

have been lately inserted in the collection of the author's works on similar topics, printed at Florence, with other treatises, on the laguna of Venice, on the improvement of the Pontine, Bolognese, Ferrarese, and Romagnese marshes, &c. Guglielmini, though in other things he impugns Castelli, allows him the honour of having first applied geometry to the motion of water; and Montucla (Hist. Math. t. ii. p. 201.) calls him "The Creator of a new Part of Hydraulics." He died at Rome in 1644.

CASTELLI, BERNARD, an eminent painter of history and portrait, was born at Genoa in 1557, and studied his art under Andrea Semini and Luca Cambiaso, preferring the principles of the first, and in his practice imitating both. He afterwards visited Rome for farther improvement, and there he acquired distinction. He had a ready invention, and when he chose to exert himself, he had sufficient correctness and grace; but he became a mannerist, and frequently adopted the colour and dispatch of Vasari and Zucchari. The most distinguished poets of his time, whose portraits he painted, celebrated him in their verses. Marino and Tasso, in particular, were his intimate friends; and he made designs for the Jerusalem of the latter. The subject of his altarpiece for St. Peter's at Rome was the call of St. Peter to the apostleship; but this was afterwards removed, to make room for one executed by Lanfranco. The principal works of Castelli are at Genoa and Turin. As an engraver, his style somewhat resembled that of Cornelius Bus. Among other works in this department is a set of prints for Tasso's poems. He died in 1629. Pilkington, by Fuseli. Strutt.

CASTELLI, VALERIO, son of the former, was born at Genoa, in 1625, and received his first instructions in the school of Domenico Fiasella; but he gained his principal knowledge in the art of painting by studying the works of the most celebrated masters at Milan and Parma. He thus much improved his taste of design, composition, and colouring. His reputation for drawing, colouring, and the elegant turn of his figures, placed him in a rank far superior to his father. His most favourite subjects were battles; and his horses are drawn in an admirable style. In this style of painting he is said to have united the fire of Tintoretto with the fine taste and composition of Paolo Veronese. With respect to historical subjects he possessed great merit both in easel pictures and in those of larger dimensions. The cupola of the church, and the annunciation at Genoa, which is described as a noble composition, was painted by this master; and at Florence, in the palace of the grand duke, there is another excellent painting, the subject of which is the Rape of the Sabines. His picture, representing Christ taken down from the Cross, is in the collection of the earl of Pembroke at Wilton; and it is said that more of the easel pictures of Castelli are to be found in the collections of England than in any other part of Europe. His health was injured by his assiduous labour; and he died at Genoa at the early age of 34, in 1659. Pilkington.

CASTELLI, G. B. See CASTELLO.

CASTELLIAR, in *Geography*, a town of Germany, in the county of Tyrol; 7 miles S.S.E. of Bolzano.

CASTELLINA, a town of Italy, in the duchy of Parma; 12 miles W.N.W. of Parma.

CASTELLIO, a town of Naples, in the province of Principato Citra; 16 miles W.S.W. of Policastro.

CASTELLO DELLA ABBATE, a town of Naples, in the province of Principato Citra; 29 miles S.W. of Canigiano.

CASTELLO d'Albore, a town of Naples, in the province of Principato Ultra; 10 miles N.E. of Benevento.

CASTELLO *Arragonefe*, a sea-port town on the N.W. coast of the island of Sardinia, with a good harbour, the see of a bishop, suffragan of Sassari; 18 miles N.E. of Sassari. N. lat. 40° 56'. E. long. 8° 57'.

CASTELLO *Bianco*, a town of Genoa; 7 miles N. of Albenga.

CASTELLO *di Chiara*, a town of Sardinia; 43 miles N.E. of Cagliari.

CASTELLO *Franco*, a town of Naples, in the province of Calabria Citra; 4 miles N.W. of Cosenza.—Alfo, a town of Naples, in the province of Principato Ultra; 14 miles E.N.E. of Benevento.—Alfo, a town of Italy, in Trevisan, belonging to the state of Venice; 9 miles W.S.W. of Treviso.—Alfo, a town in the state of Genoa; 11 miles N.E. of Vintimiglia.

CASTELLO *St. Giovanni*, a town of Italy, in the duchy of Piacenza; 10 miles W. of Piacenza. It was taken by the French in 1796.

CASTELLO *Guidone*, a town of Naples, in the county of Molise; 11 miles N. of Molise.

CASTELLO *Lanbazo*, a town of Portugal, in the province of Entre Duero e Minho; 1½ league E. of Braga.

CASTELLO *Maggiore*, a town of Italy, in the republic of Lucca; 12 miles W.N.W. of Lucca.

CASTELLO *a Mare*, a town of Sicily, in the valley of Mazara; 19 miles W.S.W. of Palermo.

CASTELLO *a Mare di Stabia*, a sea-port town of Naples, in the province of Principato Citra, built near the ruins of Pompeia and Stabia, the see of a bishop, suffragan of Sorrento, containing 6 parish churches and 10 convents; 4 miles N.E. of Sorrento. This is a long town, lying at the bottom of the bay, sheltered to the south by high mountains that approach so near to the water-edge, as to leave only a very narrow slip for the buildings, many of which are boldly and beautifully placed on the lower points of the hills. The king has a charming villa above the city. The port is small and artificial, more frequented by latten-sail barks than by ships. This place rose by the ruin of the inland towns.

CASTELLO *a Mare della Brucca*, a town of Naples, in Principato Citra; 18 miles W. of Policastro.

CASTELLO *Marinha*, a town of Portugal, in the province of Entre Duero e Minho; 5 miles N.W. of Barcelos.

CASTELLO *della Minerva*, a town of Naples, in Principato Citra; 16 miles S.W. of Amalfi.

CASTELLO *Monardo*, a town of Naples, in the province of Abruzzo Ultra; 14 miles S.W. of Aquila.

CASTELLO *Mondo*, a town of Portugal, in the province of Beira; 2½ leagues E.N.E. of Beira.

CASTELLO *Novato*, a town of Italy, in the duchy of Milan; 20 miles W. of Milan.

CASTELLO *Nuova*, a town of Italy, in the county of Friuli, belonging to the state of Venice; 18 miles N.W. of Udina.

CASTELLO *Nuovo di Terzi*, a town of Italy, in the duchy of Piacenza; 5 miles S. of Buffeto.

CASTELLO *Nuovo*, a town of the duchy of Modena; 9 miles N.N.W. of Reggio.

CASTELLO *Nuovo*, a town of Italy in the Bressan; 22 miles S. of Brescia.

CASTELLO *de Nubrega*, a town of Portugal, in the province of Entre Duero e Minho; 2 leagues N. of Braga.

CASTELLO *de Onigo*, a town of Italy, in the Trevisan, belonging to the state of Venice; 12 miles N.W. of Treviso.

CASTELLO *della Orfo*, a town of Naples, in Principato Citra; 6 miles S.S.W. of Salerno.

CASTELLO *Pignano*, a town of Naples, in the county of Molise; 3 miles E.S.E. of Molise.

CASTELLO *de la Plana*, a town of Spain, in the province of Valencia, near the sea-coast, containing one parish church, six convents, and 10,733 inhabitants. This place is famous for its rich collection of pictures. Near Castellen is the river Mijares, which supplies water to the aqueduct of Almafora, a tunnel that passes through a rock of limestone, and being executed in 1240, deserves to be regarded as stupendous.

CASTELLO *di Ponte*, a town of Italy, in the Bellunese, belonging to the state of Venice; 4 miles N. of Belluno.

CASTELLO *Puffedengo*, a town of Italy, in the Lodofan; 10 miles S.S.E. of Lodi.

CASTELLO *de Real*, a town of Portugal, in the province of Entre Duero e Minho.

CASTELLO *della Ripa*, a town of Italy, in the duchy of Spoleto; 8 miles S.W. of Todi.

CASTELLO *di Sangro*, a town of Naples, in the province of Abruzzo Citra; 15 miles S.E. of Sulmona.

CASTELLO *Seprio*, a town of Italy, in the duchy of Milan; 19 miles N.W. of Milan.

CASTELLO *de Sorotico*, a town of Portugal, in the province of Entre Duero e Minho; 2 leagues N.E. of Amarante.

CASTELLO *Vel*, a town of Spain, in Catalonia; 3 leagues from Terramoli.

CASTELLO *Vetere*, a town of Naples, in the province of Calabria Ultra, containing one collegiate and nine parish churches, and 4 convents; 12 miles N. of Gierace.

CASTELLO *de Vide*, a town of Portugal, in the province of Alentejo, containing about 5700 inhabitants; 3 leagues E.N.E. of Pontalegre.

CASTELLO *dell' Volturno*, a town of Naples, in the country of Lavora; 11 miles W.S.W. of Capua.

CASTELLORUM OPERATIO, castle work, or service and labour done by the inferior tenants for the building and upholding of castles of defence; towards which some gave personal assistance, and others paid their contributions. This was one of the three necessary charges, to which all lands among our Saxon ancestors were expressly subject. See CASTLE.

CASTELLUCCIO, in *Geography*, a town of Naples, in the province of Capitanata; 6 miles from Troja. This is a kind of double town; one part of which is agreeably situated upon a rocky eminence, with a declivity that shews all the houses as if they were upon terraces, and the other part, built at its foot, amidst a delightful tract of fields, rich in vines and fruit-trees, and bounded by rows of towering oaks.

CASTELLUM, in *Ancient Geography*, a place of Palestine, on the sea of Galilee, near Tiberias.—Also, an episcopal see of Africa, in Numidia.—Also, an African episcopal see, in Mauritania Cæsariensis.—Also, a town and episcopal see of Africa, in Mauritania Setifensis.—Also, a place of Italy, S.W. of Faventia, belonging to the Boii.

CASTELLUM *Drasi et Germanici*, a place mentioned by Tacitus (Annal. 156.), on the other side of the Rhine; the ruins of which still bear the name of "Ali Konigstein," or the old royal monument.

CASTELLUM *Faberitanum*, an episcopal city of Africa, in Mauritania Cæsariensis.—C. *Medianum*, an episcopal see of Africa, in Mauritania Cæsariensis; called "Monumentum Medianum" by Ammianus Marcellinus.—C. *Menapiorum*, *Kessel*, a fortress of Gaul, on the left of the Meuse.—C. *Minoritanum*, an episcopal see of Africa, in Mauritania Cæsariensis.—C. *Morinorum*, *Cassel*, a place of Gaul, called

simply *Castellum* in the Itinerary of Antonine; it was at some distance to the east from Bononia, and N.E. of Tarruenna. See CASSEL.—C. *Ripense*, an episcopal see of Africa, in Mauritania Cæsariensis.—C. *Romanum*, *Brittenburg*, a fortress at the extremity of the Rhine, called by some authors ARX *Britannica*, which see.—C. *Tatropontense*, an episcopal see of Africa, in Mauritania Cæsariensis.—C. *Titulianum*, or *Titulitanum*, an episcopal see of Africa, in Numidia.—C. *Trajani*, *Cassel*, a fortress situated to the right of the Rhine, at a place where it received the name of Mænus, the Mayne. This fortress was repaired by Julian, and is different from another situated a little more to the east, and which is mentioned by Tacitus.

CASTELLUS, BARTHOLOMEW, in *Biography*, an Italian physician of considerable learning and eminence, practised at Messina the latter part of the 16th and beginning of the 17th centuries. He was author of two works, both for a long time extremely popular. "Totius Artis Medicæ, Methodo divisa, Compendium et Synopsis, in qua quidquid ab Hippocrate, Galeno, Avicenna, summisque in Arte Doctoribus scriptum est, continetur," Messan. 1597, 4to. This has been many times reprinted, the last time at Geneva, in 1746. "Lexicon Medicum Græco-Latinum," Venice, 1607, 4to. This work still retains its popularity. It has passed through numerous editions, and been much enlarged and improved, particularly by Vander Linder, and afterwards by Jacob Bruno. The last edition was printed at Naples in 1761. Haller Bib. Med.

CASTELLUZZA, in *Geography*, a town of Naples, in the province of Principato Citra; 12 miles E. of Salerno.

CASTELLUZZO DI SCHIAVI, a town of Naples, in the province of Capitanata; 8 miles E. of Troja.

CASTELMARMORA, a town of Asiatic Turkey, in the province of Natolia; 28 miles S.W. of Mogla.

CASTELMIRABEL, a town of the island of Candia, in the Mediterranean, on the north coast of a large bay; 18 miles W. of Settia.

CASTELNAU, MICHAEL DE, in *Biography*, an eminent commander and statesman in the reigns of Charles IX. and Henry III. of France, was employed in many important negotiations, and being five times ambassador in England, resided here for 10 years successively in his first embassy. He took an active part in favour of Mary queen of Scots; endeavouring to reconcile her to her husband Darnly, and interceding in her favour under the harsh treatment of Elizabeth. He died in 1592. The memoirs of his negotiations, published by Le Laboureur, in 2 vols. fol. in 1659, and reprinted at Brussels in 1731, are regarded among the most curious and valuable materials of the age, and written in a pure and unaffected style, without passion or partiality. His daughter Catherine was mistress of four languages, and translated her father's memoirs into English. Nouv. Dict. Hist. Roberton's Hist. of Scotland, vol. i. p. 318, &c. vol. ii. p. 128.

CASTELNAU *de Bonnafoux*, in *Geography*, a town of France, in the department of the Tarn, and district of Alby; one league W. of Alby.

CASTELNAU *sur Gupie*, a town of France, in the department of the Lot and Garonne; 1½ league N.N.W. of Marmande.

CASTELNAU *de Magnoac*, a town of France, and seat of a tribunal, in the department of the Higher Pyrenées, and chief place of a canton in the district of Bagnères; 20 miles E. of Tarbe. The place contains 1200, and the canton 10,296 inhabitants; the territory comprehends 192½ kilometres and 32 communes.

CASTELNAU *de Medoc*, a town of France, in the department

ment of the Gironde, and chief place of a canton in the district of Bordeaux; 14 miles N.N.W. of Bordeaux. The place contains 1008, and the canton 12,574 inhabitants; the extent of the territory comprehends 950 kilometres and 19 communes.

CASTELNAU *de Montmirail*, a town of France, in the department of the Tarn, and chief place of a canton in the district of Gaillac; 2 leagues N.W. of Gaillac. The place contains 2523, and the canton 9715 inhabitants; the territory includes 162½ kilometres and 15 communes.

CASTELNAU *de Montratier*, a town of France, in the department of the Lot, and chief place of a canton in the district of Cahors; 4 leagues S. of Cahors. The place contains 4271, and the canton 8861 inhabitants; and the territory includes 182½ kilometres and 8 communes.

CASTELNAU *de Rivière-basse*, a town of France, in the department of the Upper Pyrenées, and chief place of a canton in the district of Tarbe; 7 leagues N.N.E. of Pau. The place contains 1252, and the canton 4574 inhabitants; the territory includes 72½ kilometres and 8 communes.

CASTELNAU *de Strettsfond*, a town of France, in the department of the Upper Garonne, and district of Toulouse; 4 leagues N. of Toulouse.

CASTELNAUDARY, a town of France, and principal place of a district, in the department of Aude; before the revolution, the capital of Lauragais; seated on an eminence, near the grand reservoir which supplies the canal of Languedoc. The place contains 7610, the north canton 13,813, and the south canton 12,629 inhabitants; the territory of the former includes 285 kilometres and 19 communes; that of the latter 145 kilometres and 13 communes. N. lat. 43° 19'. E. long. 1° 51'.

CASTELOMONTE, a town of Piedmont, in the marquisate of Ivrea; 7 miles S.S.W. of Ivrea.

CASTELPROTISSA, a town on the south coast of the island of Candia; 25 miles S.S.W. of Caudia.

CASTELVETRO, Lewis, in *Biography*, an eminent Italian scholar, was a native of Modena, descended from a noble family, and born in 1505. Educated in the universities of Bologna, Ferrara, Padua, and Sienna, he graduated at the latter place in law, being designed by his father for that profession; but his natural inclination led him to the cultivation of polite literature. In his native place he was assiduous in promoting letters among his countrymen, and became an active member of the newly-erected academy. His connection with this learned body occasioned his being suspected of heresy, and his quarrel with Annibal Caro (see CARO) contributed to his being accused to the inquisition as unfound in the faith. In 1557 he was cited to Rome, but dreading an examination, he for some time concealed himself; but at length, in 1560, he repaired thither, and after being thrice examined, he thought it most prudent to make his escape; the consequence of which was the publication of a sentence, previously pronounced against him, as a contumacious heretic. At Chiavenna, where he settled for some time, he gave private lectures to several students on Homer, and on the rhetoric addressed to Herennius. From thence he removed to the court of Maximilian II. at Vienna, and dedicated to that emperor his commentary on Aristotle's Poetics. Being driven from Vienna by the plague, he returned to Chiavenna, where he died in 1571. Castelvetro was an accurate grammarian, and an acute though somewhat too censorious critic. He took pains in perfecting the Italian language, and wrote remarks of a grammatical and critical kind on several authors, both ancient and modern, which were first published by Muratori in 1727. His "Examination of the Rhetoric addressed to Herennius,"

was printed in 1653. His "Exposition of Petrarch's Poems," which he left unfinished, was published by his nephew. He composed various pieces in Latin verse, with great elegance; and his skill in Greek was manifest in his version, with a commentary, of Aristotle's Poetics, and in his Italian translation of Chrysostom's exposition of the Gospels. He also studied the Provençal tongue, and translated, in conjunction with Barbieri, into Italian, many of the poems and lives of the Provençal poets, and gave a grammar of the language. Gen. Dict. Gen. Biog.

CASTER, in *Geography*, a town of Germany, in the circle of Westphalia, and duchy of Juliers; 8 miles E.N.E. of Juliers.

CASTER, or CAISTOR. See CASTOR.

CASTETS, a town of France, in the department of Landes, and chief place of a canton in the district of Dax; 7 miles N. of Dax. The place contains 877, and the canton 5429 inhabitants; the territory includes 640 kilometres and 10 communes.

CASTHANÆA, or CASTANÆA, in *Ancient Geography*, a town of Thessaly, in Magnesia, at the foot of mount Pelion.

CASTIGATION, *Castigatio*, among the Romans, the punishment of an offender by blows, or beating with a wand or switch. Castigation was chiefly a military punishment, the power of inflicting which on the soldiery was given to the tribunes. Some make it of two kinds, one with a stick or cane, called *fusligatio*; the other with rods, called *flagellatio*; the latter was most dishonourable.

CASTIGATIONS, in a *Literary Sense*, denote corrections, or emendations of the text of an ancient writer.

CASTIGATORY. See CUCKING stool.

CASTIGLIOLA, in *Geography*, a town of Piedmont, in the county of Asti; 5 miles S.S.W. of Asti.

CASTIGLIONE, BALDASSAR, in *Biography*, an eminent statesman and writer of Italy, was born of noble parents at the villa of Casatico near Mantua in 1468. He studied first at Milan, and commenced his political career at an early period, as page to Lewis Sforza, duke of Milan. In 1499 he attached himself to Gonzaga, marquis of Mantua, and in 1504 entered into the service of Guidubaldo, duke of Urbino, in whose court, which was then the favourite resort of science and letters, he resided for several years. This duke sent him as his ambassador to Henry VII. king of England in 1506, and in the following year he attended in the same capacity on Lewis XII. then at Milan. On the death of Guidubaldo in 1508, he remained in the service of the new duke, Francis Maria della Rovere, whom he accompanied in several military expeditions as lieutenant-general of the army of the church under pope Julius II. He was recompensed for his services in 1513 by the castle of Nuvara near Pefaro, and the grant was confirmed to him by pope Leo X. Upon his return to Mantua, he regained the favour of the duke Gonzaga, whom he had offended by quitting his service, and in 1516 married Maria Hippolita, a lady no less illustrious for her birth than for her beauty and accomplishments. This lady was distinguished by her Latin and Italian compositions, both in prose and verse; and her poems are published in a collection of the works of five illustrious Italian poets. This connection terminated in 4 years by the death of Hippolita. Castiglione was afterwards employed by the marquis Frederic of Mantua as his ambassador to Rome, where he remained several years and enjoyed that kind of literary society to which he was attached and of which he was a principal ornament. He was particularly distinguished by his researches into all the remains of antiquity, and by his exquisite

quisite taste in the fine arts. In 1522 he returned to Mantua, with a view of serving his prince in the war against the French. When he again visited Rome, he was employed by pope Clement VII. in 1524 as nuncio to the emperor Charles V.: but failing to terminate the difference between the imperial and papal courts, and incurring unjust suspicions on the part of Clement, his disappointment and anxiety were the occasions of an illness, of which he died at Toledo in 1529. Five years after his death, his body, which had been interred with great solemnity in the cathedral, was removed by order of his mother to a church five miles from Mantua, in which a superb mausoleum was erected to his memory, with an inscription written by cardinal Bembo. His statue has been since placed in the royal academy of Mantua. The most celebrated of his works is "Il Cortigiano" or the Courtier, discussing the manner of living in courts, so as to be useful and agreeable to the prince, and containing a variety of reflections and maxims, delivered in an easy and elegant style, which has rendered it an original and classical work. It was finished in 1518, reviewed by his friend Bembo, but not printed till the year 1528. It passed speedily through several editions, and was translated into most of the languages of Europe. It is denominated by the Italians "the golden book," and a fine edition of it was printed so lately as 1733 at Padua, with the life of the author prefixed by Bernardino Marliani. On account of some free expressions it was inserted in the list of prohibited books; but in 1576 the author's son obtained for a corrected form of it a licence from the congregation of the index. The letters of Castiglione were published at Padua in 2 vols. in 1769, with annotations by the abbat Saraffi. His Italian poetical compositions have been published separately, and his Latin productions were published in the first volume of the "Deliciz Poet. Italor. by Gruter." Moretti. Gen. Biog.

CASTIGLIONE, GIOVANNI BENEDETTO, called GRECHETTO, an admired painter, was born at Genoa in 1616, and studied first under Battista Pagi and afterwards in the academy of Giovanni Andrea de Ferrari; but he owed his chief improvement to the instructions of Vandyck, who at that time resided at Genoa. His manner of design, in all branches of his art, was grand; and he equally succeeded in all; in sacred and profane history, landscape, cattle, and portrait; all which he executed with an equal degree of truth, freedom, and spirit. His predominant inclination, though he possessed an universal genius, led him to select rural scenes and pastoral subjects, markets, and animals, in which he had no superior. He combined with great readiness of invention a bold and noble tint of colouring, elegant, and generally correct, drawing, a judicious touch, and a free and firm pencil: and he also happily applied the chiaro-scuro, which he thoroughly understood, through all his works. In the chapel of St. Luke's church at Genoa, is an excellent picture by this master: also in the Palazzo Brignole is a grand composition; and at Palazzo Caragha in the same city is an historical picture of Raphael concealing the Teraphim from Laban, in which the figures and animals are very fine. The etchings of this celebrated artist, which are numerous, are spirited, free, and full of taste: and their effect is, in general, powerful and pleasing. Among his most estimable plates, may be reckoned the following, all from his own compositions: viz. "Animals coming to the ark;" "Laban searching for his gods in the tent of Jacob;" "The angel appearing to Joseph in a dream;" "The nativity of our Saviour;" "The flight into Egypt;" "The resurrection of Lazarus;" "Diogenes with his lantern;" "A magician with several animals;" "The little melancholy;" "A ruin with a vase,

and two men, one of them pointing to a tomb;" two "rural subjects, with fauns and satyrs;" and two "sets of heads." He died in 1670. Pilkington. Strutt.

Francesco Castiglione, the son of Benedetto, was the disciple of his father, and was born at Genoa. He inherited in a very considerable degree the talents of his father, and imitated his style and manner exactly, in composition, handling, and design. Many pictures, ascribed to Benedetto, and occurring in sales and collections, are thought to be copies after him by his son Francesco, or perhaps originals of the younger Castiglione. Pilkington.

CASTIGLIONE, in *Geography*, a town of Italy, belonging to the republic of Lucca, insulated in the Modenese; 18 miles N. of Lucca.—Also, a town of Italy, in the republic of Lucca, 8 miles S.W. of Lucca.—Also, a town of Italy, in the duchy of Tuscany, situated on a lake near the sea. This lake, which is two leagues in diameter, and communicates with the sea, produces great quantities of salt. The reservoirs contain 4,859,000 cubic feet of water, which after evaporation, leave 11,000,000 pounds of salt.—Also, a town in the state of Genoa; 23 miles E. of Genoa.—Also, a town of Naples, in the province of Principato Citra; 5 miles N.E. of Salerno.—Also, a town of Naples, in the province of Abruzzo Citra; 6 miles E.S.E. of Civita Borella.—Also, a town of Naples, in the province of Calabria Citra; 17 miles S.S.W. of Cosenza.—Also, a town of Sicily, in the valley of Demona; 9 miles W.N.W. of Taormino.—Also, a town of Italy, in the duchy of Mantua; 9 miles W. of Mantua.

CASTIGLIONE *di Gatti*, a town of Italy, in the Bolognese; 20 miles S. of Bologna.

CASTIGLIONE *della Stivera*, a town of Italy, and principally, in the duchy of Mantua, defended by some fortifications and a citadel; and containing about 3000 inhabitants; 20 miles N.W. of Mantua. In 1796 a battle was fought near this town between the Austrians and French, in which the latter took 6000 prisoners.

CASTIGLIONIA, in *Botany*, Flor. peruv. pl. 37. Clafs and order, *polygamia monœcia*.

Gen. Ch. *Cal.* five-leaved, permanent; leaves oblong, the three exterior ones largest. *Cor.* Petals five, oblong, villous on the inner side. *Stam.* ten. *Pist.* Germ superior, three-sided, surrounded by five scales; style trifid; stigmas three, bifid. *Peric.* Capsule three-sided, six-furrowed, three-celled, three-valved. *Seeds* solitary. A shrub. *Flowers* in racemes; male ones intermingled with the others and differing from them only in the barrenness of the germ. A native of Peru.

CASTIGLIUNI, in *Geography*, a town of Naples, in the province of Principato Ultra; nine miles E.N.E. of Conza.

CASTIL BLANCO, a town of Spain, in the province of Andalusia; five leagues N. of Seville.

CASTILE, a country of Spain, comprehending the provinces of Old and New Castile, and the kingdom of Castile. Some have referred the origin of this name to a certain old Spanish tribe, or nation, called by the Romans "Castellani," who are supposed to have inhabited these parts of Spain, as well as Catalonia. But others with greater probability have traced it no higher than the recovery of this country out of the hands of the Moors; at which time, they say, there was a strong castle built for the defence of the frontier, in which the count, or great officer of the province, resided, from whence it took its name and its arms. Whilst *Old Castile*, so called because it was recovered from the Moors long before that which is styled the *New*, remained under the dominion of the Moors, there were several great lords
who

who maintained themselves in the possession of certain districts, and who, gradually increasing in wealth and power, at length shook off the yoke of the infidels, and put themselves under the protection of the kings of Oviedo. According to this account, it is probable that these lords had each of them a well fortified mansion, or castle; whence, at the emancipation of this province from the yoke of the Moors, it might well receive the name by which it has ever since been known. These lords, supported by their new protector, were not only able to defend their frontier, but to extend their little territories by their excursions against the Moors, as often as any favourable opportunity occurred, and hence assumed the title of counts; and being regarded as feudatories of the monarchs before mentioned, were summoned in time of war to repair with their vassals to attend the king's standard, and in time of peace were called to the assemblies of the estates. The first of these counts, mentioned by name in the Spanish histories, is Don Rodriguez, who flourished in the reign of Don Alonso el Casto, or the Chaste, about the close of the 9th century, whom he assisted in his wars against the infidels. Castile, from being only a county, and subject to the kings of Leon, was erected in 1016 into an independent kingdom: and in 1037 the two kingdoms of Leon and Castile were united in the person of Ferdinand I. of Leon, and II. of Castile. This union was rendered perpetual in the person of Ferdinand II., after the death of Don Alonso of Leon, A. D. 1230; from which time these two kingdoms have never been separated, but have gradually drawn to them all the other sovereignties in Spain: those of the Christians by inheritance or marriage, and those of the Moors by conquest. Upon the death of Don Juan, king of Arragon, in 1479, Arragon and its dominions were united to the crown of Castile, in the persons of their catholic majesties Ferdinand and Isabella, who, in 1474, had been proclaimed king and queen of Castile and Leon. See ARRAGON. After this period the Spanish crowns were united and descended in the same line; and the kingdom of Castile was lost in that of Spain. See SPAIN.

CASTILE, *Old*, a province of Spain, with the title of kingdom, was formerly part of the Roman Tarraconensis, and borders all the way on the south to New Castile, from which it is divided by a high chain of mountains, extending directly from west to east; on the north it is separated from Asturias and Biscay by another range of hills branching out from the Pyrenées; but between these two provinces it has a narrow slip of land which reaches quite to the bay of Biscay: on the east it is parted by the Ebro and the mountain of Doea, for a considerable length, from Navarre and Arragon: and on the west it is bounded by Leon. The greatest extent of this province from north to south reaches from 40° 10' to 43° 15' of N. latitude, and from 1° 30' to 4° 10' of W. longitude; i. e. about 180 miles from N. to S. and about the same number from E. to W. in those parts where it has both ways the greatest extent; for its figure is very irregular, and its dimensions are in various parts very different. The principal rivers in this province are the Ebro, Duero, Pisuerga, Arlançon, and Arlança; and the chief towns are Avila, Burgos, the capital, Calahorra, Segovia, Sigüenza, and Valladolid. Its climate is somewhat different from that of New Castile, as it is more mountainous, inasmuch that some have represented it as a terrace formed by the mountains of Biscay, or by the Pyrenées, of which these are a branch. In summer this mountain-plain is destitute of water, and burnt up with heat. But, in general, whilst the vallies are very hot, the upper grounds are proportionably cold and bleak. In this country no other means are employed to counteract the severity

of the weather and the bleak winds, which, on the high open plains, are very boisterous, besides a large chafing-dish, (brafero) which is usually placed beneath the table. Stoves and chimnies are never seen in common houses. Snow covers the tops of the mountains through the summer; and it is carried away and fold in the towns, for cooling their wine. The soil, though in various parts cold, is moderately good, and might be rendered much more productive by better cultivation. The wine is much extolled; and the plains are covered with cattle, and more especially with sheep, the wool of which is much valued.

CASTILE, *New*, called also "The kingdom of Toledo," which was formerly its capital, a province of Spain, bounded on the north by Old Castile, from which it is separated by a chain of mountains known by the name of the country through which they run; on the east it is divided by a similar ridge from Arragon and Valencia; on the south it is parted from Andalusia by the mountains called Sierra Morena, and by an imaginary line from Murcia; and on the west it is separated from Estramadura and Leon by a ridge of hills called Guadalupe and La Sarena. Its length from south to north is about 180 miles, and its greatest breadth about the same number, though its form is very irregular. New Castile consists of three cantons, viz. La Mancha, the southern part, La Sierra, lying towards the east, and Algariz, which is the northern part. Its principal rivers are the Tagus, Guadiana, Guadalquivir, Xucar, Xarama, and Guadarama, besides several others of less note. The capital of this province is Madrid. As it is inland and surrounded with high mountains, its climate is hotter in summer, and colder in winter, than other districts which lie along the sea-coasts in the same latitude. It is, however, salubrious, and the soil is generally fertile, but needing cultivation. The northern parts produce fruits and wine, and the southern, good pastures and fine wool.

CASTILE *del Oro*. See TERRA Firma.

CASTILLAN, in *Commerce*, a gold coin, current in Spain, valued at fourteen rials and a half.

CASTILLAN also denotes a weight used by the Spaniards in the weighing of gold, containing the hundredth part of a Spanish pound. It is also used at Buenos Ayres, and the mines of Chili and Potosi.

CASTILLE, in *Military Language*, a term that was formerly made use of to denote the attack of a tower or castle. This attack became also a sort of military sport or play, in which those who carried it on used snow-balls. In 1546, the division, being surprised in one of those attacks, that was executed at *Roche Guyon*, became angry and heated, a circumstance that cost the duke d'Enghien his life, and put a period to the games or sports in France called *Castilles*, as that which occasioned the death of Henry III., put an end to the martial game or exercise of tournament.

CASTILLEJA, in *Botany*, (so called by Mutis in honour of Castillejus, a Spanish botanist, resident at Cadiz,) Linn. jun. Supp. p. 47. Schreb. Gen. 1059. Willd. 1205. Juss. p. 100. Vent. vol. ii. 299. Class and order, *diddynamia angiosperma*. Nat. ord. *Personata*, Linn. *Pediculares*, Juss. *Rhinanthoides*, Vent.

Gen. Ch. Cal. perianth one-leaved, tubular, longitudinally cloven in front more than half-way down, nerved, coloured, somewhat swelling at the base. Cor. monopetalous, gaping; upper lip long, channelled, curved inwards, emarginate, pubescent on the back; lower lip very short, trifid; segments acute, with two glands between them inserted into the throat of the corolla. Stam. filaments four, inserted into the base of the corolla, the length of the upper lip, filiform, smooth; the lower pair a little shorter;

anthers twin, linear, oblique. *Pist.* germ superior, oblong; style filiform, the length of the stamens; stigma simple, obtuse. *Peric.* capsule ovate, compressed, two-celled; the partition contrary to the valves. *Seeds* numerous, small.

Eff. Ch. Calyx tubular, cloven longitudinally more than half-way down; lower lip of the corolla very short, trifid, with two glands between the segments; capsule two-celled.

Sp. 1. *C. fissifolia*, Smith Ined. tab. 39. *Mut. Amer.* vol. i. tab. 11. *Lam. Illust. pl.* 519. fig. 2. "Leaves pinnate-gashed near the tip." *Root* perennial, branched, fibrous. *Stem* three or four feet high, herbaceous, or somewhat woody, erect, roundish, with few branches, pubescent. *Leaves* alternate, sessile, spreading, entire at the base, pinnatifid near the tip, pubescent on both sides, three-nerved; segments from three to seven; stipules none. *Flowers* towards the ends of the larger branches, solitary, peduncled, specious, probably scarlet; proper bractes none; peduncles round, pubescent, scarcely one-third of the length of the leaves. A native of New Granada. 2. *C. integrifolia*, Smith Ined. tab. 39. *Mut. Amer.* vol. i. tab. 12. *Lam. Illust. Pl.* 519. fig. 1. "Leaves linear-lanceolate, entire." *Stem* herbaceous, round, upright, branched, leafy, slightly rough, with hairs. *Leaves* alternate, sessile, spreading, obtuse, slightly channelled, nerved, pubescent on both sides; stipules none. *Flowers* on the elongated ends of the branches, forming a sort of raceme, each from the axil of its own bract-shaped leaf, a little smaller than those of the preceding species; peduncles filiform, upright, shorter than the leaves. A native of New Granada, where both species were discovered by Mutis.

CASTILLO, CASTELLO or CASTELLI, GIO BATISTA, in *Biography*, an eminent painter of history of the 16th century, commonly called *Il Bergamasco*, in contradistinction to Gio. Bat. Castelli, a Genoese, scholar of Cambiaso, and the most celebrated miniature-painter of his time, was born at Bergamo, and conducted to Genoa by Aurelio Bufo of Crema, and left by him in that city. In this forlorn state, he was patronised by the Pallavicini family, who sent him to Rome, where he was formed an architect, sculptor, and painter, not inferior to Cambiaso. At Rome, Palomino reckons him among the scholars of Michael Angelo. He was the companion of Lucas Cambiaso, and adopted his technic principles; and we discover, says Mr. Fuseli, the style of Raffaello verging already to practice, but not so mannered as that which prevailed at Rome under Gregory and Sixtus. In Cambiaso we recognise a greater genius and more elegance of design; in Castello, greater diligence, deeper knowledge, a better colour, a colour more nearly allied to the Venetian than the Roman school. These two artists assisted each other, even on occasions where they appeared to be competitors. Thus, at the Nuntiatedi di Portoria, Lucas on the pannels represented the final doom of the blessed and the rejected in the last judgment; whilst G. Batista on the ceiling, expressed the judge in an angelic circle receiving the elect. His attitude and semblance speak the celestial welcome with greater energy than the adjoined capitals of the words "Venite Benedicti." This is a picture studied in all its parts, of a vivacity, composition, and expression, which give to the pannels of Lucas the air of a work done by a man half asleep. He also worked alone; such is the S. Jerome surrounded by monks frightened at a lion, in S. Francesco di Castello, and the crowning of St. Sebastian after martyrdom in his own church, which is a picture as rich in composition as studied in execution, and superior, says Mr. Fuseli, to all my praise. This artist, though little known in Italy, passed the last years of his life at Madrid, as painter to the court. He died in 1570, at the age of

70 years. He had two sons, Fabrizio and Granello, whom he took with him to Spain as his assistants, whose works in the Escorial are much commended. Pilkington's Dict. by Fuseli.

CASTILLO Y SALVEDRA, ANTONIO DEL, a celebrated Spanish painter, was born at Cordova in 1603, and having studied under his father Augustin, perfected himself in the school of Zurbaran at Seville. On his return to his native place, he was employed in a variety of works, evincing his great skill in drawing and design, but not equal in colouring. He practised in history, portrait, and landscape, with great reputation. In 1666, he revisited Seville, where, on seeing some of the brilliant productions of Murillo, he gazed on them with silent admiration, and then suddenly exclaimed, "Castillo is no more." After his return to Cordova, he died in less than a year of melancholy and despair. Castillo united the talent of poetry to that of painting. Cumberland's *Anecdotes of Spanish Painters*. *Nouv. Dict. Hist.*

CASTILLO de Sancho Abarga, in *Geography*, a town of Spain, in Navarre; 5 leagues from Tudella.

CASTILLON, a town of France, in the department of the Gironde, and chief place of a canton, in the district of Libourne; 3 leagues S.E. of Libourne. The place contains 2580, and the canton 10,713 inhabitants; the territory includes 117½ kilometres and 16 communes.

CASTILLON, a town of France, in the department of the Arriege, and chief place of a canton, in the district of St. Giron; 7 miles S.W. of St. Giron. The place contains 742; and the canton 12,112 inhabitants. The territorial extent comprehends 350 kilometres and 25 communes.

CASTILLONES, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the district of Villeneuve-d'Agen; 5 miles E. of Lauzun. The place contains 1756, and the canton 7123 inhabitants: the territory includes 117½ kilometres and 15 communes.

CASTINE, the shire-town of Hancock county, in the district of Maine, N. America, situated on Penobscot bay. It was separated from Penobscot, and incorporated in 1796. It takes its name from a French gentleman who resided here more than 130 years ago.

CASTINE River, which is about 14 miles long, is navigable for 6 miles, and has several mills at the head of it. It discharges itself into Penobscot bay.

CASTING is sometimes used for the quitting, laying, or throwing aside any thing; thus, deer cast their horns, snakes their skins, lobsters their shells, hawks their feathers, &c. annually.

CASTING of feathers, is more properly called *moulting*, or *merwing*.

A horse casts his hair or coat at least once a year, viz. in the spring, when he casts his winter coat, and sometimes at the close of autumn he casts his summer coat, in case he hath been ill kept.

Horses sometimes also cast their hoofs, which happens frequently to coach-horses brought from Holland; which being bred in a moist, marshy country, have their hoofs too flabby; so that coming into a drier soil and less juicy provender, their hoofs fall off, and others, that are firmer, succeed.

CASTING is also used for distributing or disposing the parts of a thing to the best advantage.

The casting of a building is more properly called *COMPARTITION*.

Theatrical writers speak of casting a play, i. e. disposing the several parts or characters to proper actors.

CASTING of candles, signifies filling the moulds with tallow. See CANDLE.

CASTING a *colt*, in *Rural Economy*, is a term that implies a mare's proving abortive.

CASTING of *drapery*, among *Painters*, denotes the distribution of the folds; and the drapery is said to be well cast, when the folds are distributed in such a manner as to appear rather the result of mere chance than of art, study, or labour. In that style of painting which is called "the grand," the folds of the draperies should be great, and as few as possible, because their rich simplicity is more susceptible of great lights. But it is an error to design draperies that are too heavy and cumbersome, for they ought to be suitable to the figures, with a combination of ease and grandeur. Order, contrast, and variety of stuffs and folds, constitute the elegance of draperies; and diversity of colours in those stuffs contributes extremely to the harmony of the whole in historic compositions.

CASTING, in *Falconry*, is any thing given an hawk to purge and cleanse his gorge. Of these there are two kinds, viz. plumage, i. e. feathers; and cotton: the latter whereof is generally in pellets about the bigness of hazel-nuts, made of soft fine cotton, and conveyed into her gorge after supper. In the morning she will have cast them out; at which time they are to be observed, and from the colour and condition they are found in, the state of her body is conjectured. If they be cast out round, white, and not stinking, nor very moist, it is an indication all is well; if otherwise, particularly if black, green, slimy, or the like, she is distempered. The casting of plumage is observed after the same manner as that of cotton.

CASTING a *figure*, among *Astrologers*, the erecting of a celestial theme, and dividing the heavens into houses.

CASTING, in *Foundry*, is the running of a melted metal into a mould prepared for that purpose.

The great importance of a knowledge of casting to a mechanic, on account of the vast quantities of cast-iron now used in machinery, has induced us to give a particular description of this branch of the founder's art.

There are three sorts of casting, 1. *open sand casting*; 2. *sand casting between flasks*; and 3. *loam-casting*; in most of which, an exact pattern, usually of wood, of the subject to be cast, is given to the founder.

I. Most articles, every part of whose surface on one side is in the same plane (which we will call the horizontal plane), and every parallel section of which is of the same size in every part as the horizontal plane, or constantly decreasing as they recede downwards from it, and the edges of all which sections fall within perpendiculars, let fall from the edges of the plane immediately above it, may be cast in *open sand*: because, as the founders express it, every such pattern will *lift* out of the sand, wherein it has been imbedded as deep as its upper or plane surface, to form the mould for the metal.

The floor of every foundry is for many feet deep composed of a loamy sand (of which great quantities are brought to London from near Woolwich) so that deep pits may be dug, to bury large moulds in. (See *FOUNDRY*). An example of open sand-casting is shewn in *Plate of Casting*, figs. 1 and 2, which represent the arms of a large wheel, the rim of which is to be screwed on by the flanches *a, a*, fig. 1; *bb* is the arm; *d* is a rib cast with it to strengthen it, the other side of the arm must be plain; *e* is the opening through which its shaft is to pass. In the place where the mould is to be made, a layer of sand, *cd*, fig. 2, is lightly sprinkled through a sieve on the floor, and the pattern *A* is pressed down into it, perfectly level; the next operation is shovelling the sand up all round, level with the top of the pattern, and ramming it down, with a tool, fig. 4; a sponge is then used for slightly wetting the sand all round the edges of the pattern to make it adhere together; the next operation is lifting the pattern

out of the sand by one or more screws, fig. 5, screwed into the wood; if the pattern is small, this is done by one or more men, but in very large works it is done by a crane; the cores for the bolt holes through the flanches, *a, a*, fig. 1, are made by sticking pieces of dried clay in the sand in the proper places, and the core for the hole *e*, made of clay, is also set in its place; the workman then uses a pair of bellows for blowing away any small pieces of sand which may have fallen into the mould. It is now ready for filling with metal; in small works this is done by ladles, and in large, by small ditches made in the sand, from the mould to the mouth of the furnace: when the mould is filled, the metal is covered up with sand to keep the air from it.

II. *Sand-casting* between flasks is used for those articles which if they were cut into two or more pieces (provided the cutting planes were parallel to each other) each separate piece might be cast in open sand. A specimen of this sort of casting is shewn in fig. 6, which is an endless screw and spindle, often composed of cast iron. *AB* and *CD* are frames called flasks, with four handles, *c, d, e, f*, to lift by; *a, b, l, m*, are iron points fitting into holes *g, h, i, k*, in the other flask *CD*, for ascertaining when they fit each other. The under flask *CD* is set upon a board, filled with sand, and the same is rammed tight into it: the workman then takes the pattern *E F*, and presses one half of it into the sand, and smooths the sand up to the sides of the pattern with a trowel, fig. 3; he then sets the empty flask, *AB*, over the other, *CD*, putting its points *a, b, l, m*, into the holes *g, h, i, k*; and after sprinkling some sand which has been burnt over the sand in the under flask, he fills the upper one with sand, and rams it down; he next with a piece of wood, put through the sand in the upper flask, makes a hole shewn at *p*, to pour the metal through; the upper flask, *AB*, with the sand in it, is then lifted off by men, or in large works, by a crane, and the pattern, *E F*, lifted out; the flask, *AB*, is then put on again, and heavy weights are laid on it to keep it down, ready for casting. It must be observed, that at every highest point of large moulds a small hole must be made through the sand in the upper flask, to allow the air to pass out of the mould when the metal is poured in.

Figs. 7, 8, 9, and 10 shew the manner of casting a cog-wheel with eight arms, all of which are ribbed on both sides. The pattern is laid upon a board with the face shewn in fig. 7, upwards; an empty flask is laid upside downwards over the board and pattern; it is filled with sand and rammed tight; a plain board is then laid upon the flask, and two men turn it over, bringing the pattern to the top, as shewn in fig. 10; the workman with a small trowel, fig. 3, then digs all the sand out of the space *AA*, fig. 10, between each arm, leaving it level with the tops of the ribs, *ab, cd*, &c. fig. 7; into each of the spaces thus formed, a piece of iron plate, fig. 8, cut to suit the same, is laid; it has an iron rod, *a*, projecting from the upper side and two points, *b, d*, at the under side, which are inserted into the sand between the arms, so that the two edges, *e, f*, touch the upper edge of the arms *a, b*, of the wheel, fig. 7. The spaces above these plates are then filled with sand and rammed down level with the rest of the sand in the flask: burnt sand is then sprinkled over the lower flask to prevent the sand which is now to be rammed into the upper flask, *CD*, from adhering to that in the lower; the holes for the metal are next made through the top flask, and it is then taken off; the iron plates and the sand upon them are taken out by the ends of the iron, *a*; the sand round the pattern is slightly wetted, and the cogs of the wheel are taken out one by one (for which purpose they are only fixed on by a dovetailed groove cut in the rim, see *M*) and then the whole wheel is lifted out by the screws, fig. 5; the iron

plates are then put again in the place where they stood before, being determined by the holes which the points, *b, d*, made in the sand. The hole *H* through the wheel, which is to receive the shaft, is solid in the pattern, and a projection of the same size as the intended hole is fixed on; this projection forms a recess, *k*, *fig. 10*, in the sand, which is to determine the place of the core, *M*, *fig. 9*, for the hole which is made in a separate pattern of well tempered clay or wet loam and dried. The upper flask, *C D*, is then put on again, and loaded with weights ready for casting. In casting large cog-wheels, &c. flasks are often wanted as large as 20 feet on each side; to keep the sand from falling out, bars of wood are bolted across the flask, into which long nails are driven, before it is filled, to keep the sand together. These large flasks are lifted by a crane.

III. *Loam-Casting* is used for bulky articles, as cylinders, large pipes, boilers, cauldrons, &c. &c. We will begin by describing the manner of forming the mould for a large cylinder: *A*, *fig. 11*, is a beam of the building; *B B* is a spindle with three or four holes, *d c*, through it, to fix an iron arm *D* in, at different heights by a nut; *E E* is a board, that can be firmly fixed between the bars *D* and *F*, by two clamps, *G, H*: the operation is begun by laying an iron ring *L* upon the ground, and adjusting it so as to be concentric to the spindle *B*; a cylinder of brick-bats and clay or wet loam, instead of mortar, is then built upon it, some inches less in diameter than the intended cylinder, for which this is to form a core; the bricks are strongly bound together with iron hoops, nealed wire, &c. and a fire is then lighted in it. When the loam used with the bricks is dry, a coating of loam is spread over it, and is smoothed by turning the board *E E* round it. This coat makes it of the proper size for the inside of the cylinder to be cast, and is called the core of the mould; another cylinder is built, plastered, and smoothed in the same way, except that no hoops are used, whose diameter is the same as the outside of the cylinder to be cast; when it is finished, it is covered with charcoal ground with water like paint, laid on with a brush; and a thin coating of loam is laid on; this is bound round with hoops, and to these, four hooks are fixed to lift it by; a thick coat of loam and hair is then laid over it. When all these are dry, a man gets into the cylinder, and with a small pick pulls down all the bricks in the inside cylinder, and then with a trowel cuts away all the loam, leaving the inside of the external cylinder (which is called the mould) quite smooth; this is effected by the coat of charcoal, which prevents the two coats of loam from adhering together.

A deep pit is now dug, in some convenient part of the foundry, into which the core is let down by a crane; an apparatus, shewn in *fig. 12*, is used for slinging it to the crane, *A B D E* is a wrought-iron cross, the arms of which are strengthened by ties going through the ring *F*, by which it is hooked to the crane-rope or chain; on each of the four cross-bars, a ring with a hook, *a b d e*, is loosely fitted; to these hooks ropes which pass through the hooks on the mould are fastened, in the core these ropes go round the stubs, *l, l*, of the ring *L*, *fig. 11*. The mould can always be made to hang perpendicularly, by sliding the hooks, *a, b, c, d*, nearer to or farther from the center of the cross. When the core is set down in the pit, the mould is let down over it by the same means, and when they are adjusted, the sand is thrown in, and rammed round, about half the height; a flat cover of dried loam is then put on the top of the mould and core, and round pieces of wood are put in the holes which had before been made in the cover for pouring the metal in at. The burying of the mould is then completed: when it is all levelled. The sticks which keep open the holes

for the metal are carefully pulled out, and small ditches made from the furnace to them, ready for casting.

Fig. 13, shews the method of making the mould for an air-vessel (see our article *PUMP*); the core, *A*, is built of bricks, plastered with loam and turned by the machine, *fig. 11*, as before described; the edge of the board, *E E*, being cut to the proper curve; another is then built of the same size and form as the outside of the vessel to be cast, with a projecting ring or flaunch at the bottom; this, after being turned, is painted with charcoal, and the mould made upon it as in the last case; it is plain, that from the shape of the core the mould cannot be lifted off, nor can a man readily get in, to take out the bricks as in the case of a cylinder; the mould must therefore be sawn in half, *B G*, with a fine saw, to get it off; it is then put together again round the core *A*, and the crack is plastered up with loam. To describe the more complicated cases of this kind of Casting, as the nozzles or valve-boxes and pipes of steam-engines, &c. &c. would far exceed our limits.

CASTING of gold, silver, or copper, in plates. See *COINING*.

CASTING, in *Joinery*, &c. Wood is said to be cast or warped, when, either by its drought or moisture, or the drought or moisture of the air, or other accident, it shoots or shrinks; in prejudice to its flatness or straightness.

CASTING of lead on cloth, is the using of a frame or mould covered with woollen cloth and linen over it, to cast the lead into very fine sheets.

CASTING of lead on sand, is done by means of a large frame or trough nearly full of sand, which is made perfectly level, and imprinted with any device from moulds pressed down in the sand: the lead is then turned out of the kettle into a receiver or trough, and poured on the sand, whilst two persons slide a gauge or lath, of such thickness as to leave a space between it and the sand answering to the substance of the lead, along the edges of the frame; the surplus runs into reservoirs by channels made in the sand. See *CASTING*, in *Foundry*.

The goldsmiths use the bone of the CUTTLE-fish, to mould and cast their lesser works of gold and silver; that bone, when dried, being reducible to a kind of a fine pumice, very susceptible of all impressions.

CASTING in *plac* or *plaster*, is the filling with fine liquid plaster a mould that had been taken in pieces from off a statue or other piece of sculpture, and run together again. There are two things to be observed with regard to the mould: the first, that it be well soaked with oil before the plaster be run, to prevent its sticking: the second, that each piece whereof it consists have a packthread, to draw it off the more easily when the work is dry. See *CAST*.

CASTING of metals, of letters, bells, figures, &c. See *FOUNDRY*.

CASTING, in respect of *Medals*. See *MEDALS*.

CASTING, in *Rural Economy*, the operation of throwing a horse down. It is done as follows: having brought him upon some even ground that is smooth and soft, or into the barn upon soft straw, take a long rope, double it, and cast a knot a yard from the bow; put the bow upon his neck, and the double rope betwixt his fore legs, about his hinder pasterns, and under his fetlocks; when you have done this, slip the ends of the rope underneath the bow of his neck, and draw them quick, and they will overthrow him; then make the ends fast, and hold down his head. This practice is necessary upon many occasions, when operations are to be performed on horses.

CASTING, in *Seamanship*, the motion of a ship in falling off, so as to bring the direction of the wind on either side of the ship, after it had blown for some time right a-head. This term is particularly applied to a ship when her anchor first

first loosens from the ground, when she is about to depart from any place where she had anchored; and as it is probable she had been at anchor with her head to windward, it is evident she must turn it off, so as to fill the sails before she can advance in her course, which operation is called *casting*. Hence, she is said to cast the right way, or the wrong way.

CASTING-net, a sort of fishing-net, so called because it is to be cast or thrown out, which when exactly done, nothing escapes it, but weeds, and every thing within its extent, is brought away.

CASTING a point of traverse, among *Seamen*, signifies the pricking down on a chart the point of the compass any place bears from you; or finding what point of the compass the ship bears at any instant, or what way the ship has made.

CASTING of timber-work. See **CASING**.

CASTIONE, in *Geography*, a town of Italy, in the duchy of Milan; 8 miles S.W. of Milan.—Also, a town of Italy, in the Lodofan; 9 miles S.E. of Lodi.

CASTLE, *Castellum*, in *Ancient Writers*, denotes a town or village surrounded with a ditch and wall, furnished with towers at intervals, and guarded by a body of troops.

The word is originally Latin, *castellum*, a diminutive of *castrum*.

Castellum originally seems to have signified a smaller fort, for a little garrison. Though Suetonius uses the word where the fortification was large enough to contain a cohort.

The *castella*, according to Vegetius, were often like towns, built in the borders of the empire, and where there were constant guards, and fences against the enemy.

Horsley takes them for much the same with what were otherwise denominated stations. See **CASTELLA**.

CASTLE, or **CASTLE-SEED**, is also an appellation given by the country people in the north to the Roman *castella*, as distinguished from the *castra stativa*, which they usually call *chefters*. Horsley represents this as an useful criterion, whereby to discover, or distinguish, a Roman camp or station.

CASTLE, in a modern sense, is a place fortified either by nature or art, in a city or country, to keep the people in their duty, or to resist an enemy. In the more extensive interpretation of the word, it includes the various methods of encampment, see (**CASTRAMETATION**;) but in its stricter meaning, it is usually applied to buildings walled with stone, and intended for residence as well as for defence.

Few branches of historical research have been so little attended to as that which relates to *Military Architecture*. Castles, indeed, such as we now see them, were of late introduction to the world. Whether we may rank them with the accommodations of life brought by the crusaders from the East, is doubtful: but thus much seems tolerably certain, that it was in France, England, Germany, Switzerland, and Savoy, that the system of castellation first prevailed. In Italy, till the Normans got possession of Naples and Sicily, castles were comparatively few. And we may at least date their general adoption in Europe with the feudal system.

The early British fortifications seem to have been little more than mere intrenchments of earth. Cæsar, however, penetrated not far enough to know the true nature of the British fortresses; and in his work, "*De Bello Gallico*," (lib. v. § 17.) has given only the description of a lowland camp. In all parts of England there is a vast number of strong intrenchments of a very peculiar kind, situated chiefly on the tops of natural hills, and which can be attributed to none of the different people who have ever dwelt in the adjacent country, but the ancient Britons. That they may have

been used at different times, and occupied upon emergencies by the subsequent inhabitants of the island, is no more than probable; but there are many, and undoubted reasons, for deeming them the strong posts and fastnesses of the aboriginal settlers, where they lodged their wives, formed their garrisons, and made their stand. That the Britons were accustomed to fortify such places, we have the authority of Tacitus, who, describing the strong holds formed and resorted to by Caractacus, says, "Tunc montibus arduis, et si qua clementer accedi poterant, in modum valli faxa præstruit." (Annal. lib. xii. § 33.) One of these intrenchments still makes a formidable appearance on a mountain hanging over the vale of Nannerch, in Flintshire, called Moel-Arthur. But their situation being so high that they could have no supply of water except from the clouds, they were often liable to be untenable for a considerable time together.

One of the most important of these fastnesses in our own country, is the Herefordshire beacon, situated on a spot that could not but be an object of the utmost attention to the original inhabitants of those territories, which afterwards were deemed distinctly England and Wales, from the very division here formed. It is on the summit of one of the highest of the Malvern hills, and is known by the name just mentioned. It has been by turns attributed to the Romans, the Saxons, and the Danes, but its construction as a strong hold shews it was designed as a security for the whole adjacent country on any emergency. Another of these fortresses is at Bruff in Staffordshire; has been described by Mr. Pennant; (Journey from Chester, p. 47.), and exactly answers the account of Tacitus. It is placed on the summit of a hill, is surrounded by two deep ditches, and has a rampart formed of stone. Other instances are adduced by Mr. Pennant in his "*Tour in Wales*," and by Mr. King in the first volume of the "*Munimenta Antiqua*:" but a stronger instance than all perhaps is given by Mr. Gough in the *Additions to Camden*, (vol. ii. p. 404.) who shews that the true Caer Caradoc, the very fortress alluded to in the sentence we have quoted, which if not the royal seat of Caractacus, seems to have been at least his strong hold, was in Shropshire, two miles south of Clun and three from Coxal, being a large camp, three times as long as it is broad, on the point of a hill, accessible only one way, and defended on the north side by very deep double ditches, in the solid rock: whilst on the east, the steepness of the ground renders it impregnable. On the south it has only one ditch, for the same reason: and the principal entrance is on the west side, fenced with double works; whilst to the south-west it is even fenced with treble works. The most extraordinary, however, of all these kinds of fortresses is situated in Caernarvonshire, called Tre'r Caeri, or the town of fortresses. The plan and elevation of this ancient strong hold and abode is given by Mr. Pennant in his "*Tour in Wales*," (vol. ii. p. 206.) On the accessible side it was defended by three rude walls of stone; the upper ones being lofty, about fifteen feet high, and sixteen broad; exhibiting a grand and extensive front. The space on the top is an irregular area; but the whole is filled with cells; some round, and some oval, and some also oblong or square. Several of the round ones were fifteen feet in diameter; which brings to mind the houses of the ancient Gauls described by Strabo; and of those that were oblong, there was at least one even thirty feet in length. Of the same kind of fortresses were Penmaen Mawr, in Caernarvonshire, Warton Cragg, in Lancashire, Old Oswestry, in Shropshire; the irregular encampment of Maiden Castle nigh Dorchester; and probably Old Sarum, whose character was new modelled by the Romans. Mr. King, (*Munimenta Antiqua*, vol. i. p. 63.), considers the

the dens in the mountains, and the thickets of Scripture, as strong holds or hill-fortresses of the kind described. When Samson had made a great slaughter of the Philistines, we are told he went and dwelt in the top of the rock Elam; where we find, afterwards, three thousand men of Judah went up to confer with him. That hill-fortresses were used in the earliest ages there can be little doubt. The Israelites, when their land was invaded by Jabin, the king of Canaan, in consequence of an exhortation from Deborah the prophetess, assembled to make their stand upon mount Tabor. Among the Indians of South America, strong holds of a similar nature to those of Britain have been frequently discovered. (Ulloa. Voyage to South America, i. 503, 504.) And a very curious instance of the attack and surrender of one in Sogdiana, in Asia, in the time of Alexander the Great, is related by Quintus Curtius, (lib. vii. chap. xi.) The anecdote is worth the reference of the reader.

The British mode of warfare appears to have received but little alteration from the introduction of Roman tactics. Till finally subdued, their princes showed abilities both in the command of armies and in the conduct of a war; they chose their ground judiciously; formed able plans of active operation; and availed themselves of all the advantages of local knowledge: but to the fortresses described, if we may rely on the testimonies of our ancient writers, they did not very frequently retire. Their deficiencies both in the attack, the construction, and the defence of such places, must have been very obvious even to themselves; and as they delighted to live, so they usually chose to fight in open plains. Their impatient courage, and their aversion from labour, made them unable to endure the delays and fatigues of defending or besieging the castles of their time; and they often reproached the Romans with cowardice for raising such solid works about their camps and stations. (See Boadicea's famous speech to her army in Xiphilin, ex Dione in Nerone.)

Of the Roman military works in this country, they were for the greater part temporary; many, however, were stationary posts; and some few, to the retention of which the greatest importance was attached, became walled *castra*.

Cæsar, in the work already quoted, (De Bell. Gall. l. vii.), describes one of his camps as fortified very much in the manner of a walled city. A few of the Roman stations in our own country assist in throwing light on the description; and, in short, such as were so surrounded, appear to have been the link of connection between the British earth-work and the feudal castle.

Richborough, Portchester, and Pevensey, are the three greatest fortresses the Romans have left us.

Richborough, the very earliest in order of time, is supposed to have been begun in the year 43, in the reign of Claudius: but not to have been completed till 205, under the direction of the emperor Severus. There are in this distinguished fortress, says Mr. King (Munimenta Antiqua, ii. 8.) still plainly to be traced all the principal parts of one of the very greatest and most perfect of the stationary camps. The upper division for the general and chief officers; and the lower division for the legion. In the former the Prætorium with its parade; and the Sacellum or small temple for depositing the ensigns. In the walls too are the traces of the four great gates; the decuman, the prætorian, and the two posterns. The great courses of stone, with which the wall is formed, are separated from each other by alternate layers, composed entirely of a double course of bricks each; as in the walls of Verulam, Silchester, and other of our Roman towns.

The Roman remains at Portchester are not perhaps so clearly to be traced; since, having been constantly used as a fortress in succeeding ages, it has received vast and extremely

various additions: and presents us with specimens of military architecture in almost every period from the Normans to the time of queen Elizabeth.

Similar alterations, to those first mentioned, have given so strong a turn to the general character of Pevensey, that its real æra has been sometimes doubted; though portions of the Roman wall, as well as the Decuman gate, may be easily and accurately traced.

Here too it may not be irrelevant to observe that the castle at Colchester, in Essex, has been sometimes taken for a Roman fortress. And this not only because it has many of the same sort of tiles which are found in Roman walls, but because they are laid in the same manner, with bands. Though if the building is examined with attention, there may be traced in almost every part evident marks either of the later Saxon or Norman workmanship: and though many of the tiles which are used in it may have been gathered from the remains of Roman buildings, the greater part appears to have been made on purpose. (See the Archæologia, vol. iv. p. 33.)

That in the Roman times, however, there must have been many other such walled stations as those at Richborough, Portchester, and Pevensey, there can be little doubt. The Saxons, in the course of their long wars with the Britons, may be fairly supposed to have destroyed many of the fortifications which had been thus erected: and after their final settlement they neglected to repair those which remained, or to build many of their own. By these means the country became open and defenceless; which greatly facilitated the incursions of the Danes, who met with little obstruction from fortified places. That there was, however, something like a castle at Bamborough in Northumberland, we have the concurrent testimony of historians (Matth. of Westminster, p. 193. sub ann. 547. Sax. Chronicle, p. 19. Roger. Hoved. p. 238. b. Bede l. iii. c. vi. 12.): a castle at Corfe, in Dorsetshire, is said to have existed in the days of Edgar (Gough's Add. to Camden, i. 49. King's Munimenta Antiqua, iii. 209.) Portchester castle during this period, probably, retained its designation. And Mr. King (Munim. Antiq. iii. 211.) has taken considerable pains to prove that the fortress at Castleton in Derbyshire is of as high antiquity.

Alfred the Great, however, seems to have been the first of our princes with whom the building of castles became an object of national policy. Though, if Alfred's authority may be received, they were not exactly what the reader at the first mention of their name might take them for; since they were composed not only of stone but of *wood*. (Asser de Reb. gestis Alfredi, p. 17, 18.) Elfreda, too, his daughter, governess of Mercia, who seems to have been the only person in the kingdom who properly complied with the commands, and imitated the example of her illustrious father, and who inherited more of the wisdom and spirit of Alfred than any of his children, not only followed his steps by fighting many battles with the Danes, but built no less than eight castles, in the space of three years, to check their incursions. (Hen. Hunt. Hist. p. 204.) A still more remarkable instance of the knowledge of castle-building at a short period subsequent to this, may be found in William of Malmesbury (c. vi.) When he mentions the rebuilding of Exeter by Athelstan, who died in 941, "*Urbem igitur illam*," says the historian, "*quam contaminatæ gentis re-purgio defæcaverat, turribus muniuit, muro ex quadratis lapidibus cinxit.*" And from the few remains of the fortifications of this period we find that the walls precisely answer Malmesbury's description. They were faced with these four-square stones both within and without, and the intermediate space, between the facings, was filled up with rubble or rough flint stones mixed together with a strong and

and permanent cement. It is to this period too that the most judicious of our writers have referred the castle at Colchester which has been already mentioned. Its form is four-square, flanked at the four corners with strong towers, and it is about two hundred and twenty-four yards in circumference on the outside, all projections and windings included; the four sides nearly facing the four cardinal points. Some have even gone so far as to call this venerable ruin British; others, as we have already said, have attributed it with a greater share of plausibility to the Romans; but Camden and our better writers ascribe it to Edward the elder, who repaired the walls and re-edified the town in the beginning of the 10th century.

Still, however, the paucity of strong posts in the island during every period of the Anglo-Saxon history may be constantly observed. And it is more than probable that to this defect we may attribute the defeat of Harold; since it became necessary that all should be risked upon the issue of a single battle. The conqueror, himself, was evidently sensible that the want of fortified places in England had greatly facilitated his conquest, and might, at any time, also, facilitate his expulsion. He therefore made all possible haste to remedy the defect, by building magnificent and strong castles in all the towns within the royal demesnes. "William," says Matthew Paris, "excelled all his predecessors in building castles, and greatly harassed his subjects and vassals with these works." (Matthew Paris, Hist. p. 8. col. 2.) All his earls, barons, and even prelates, imitated his example; and it was the first care of every one who received the grant of an estate from the crown, to build a castle upon it for his defence and residence. The disputes about the succession, in the following reigns, kept up this spirit for building great and strong castles. William Rufus was still a greater builder than his father; and Henry I. was not idle in adding to their number. "William Rufus," says Henry Knighton (col. 2373.) "was much addicted to building royal castles and palaces, as the castles of Dover, Windsor, Norwich, Exeter, the palace of Westminster, and many others, testify; nor was there any king of England before him that erected so many, and such noble edifices." Though of one or two of these William Rufus was only the improver. But the rage for building castles never prevailed so much in any period of the English history as in the turbulent reign of Stephen, between 1135 and 1154. In this reign, says the writer of the Saxon chronicle (Chron. Sax. p. 238.), every one who was able, built a castle; so that the poor people were worn out with the toil of these buildings, and the whole kingdom was covered with castles. And this last expression will hardly appear too strong, when we are informed, that besides all the castles before that time in England, no fewer than eleven hundred and fifteen were raised from the foundation in the short space of nineteen years. (Rad. de Diceto, col. 528.) Stephen, says Holinshed (vol. iii. fol. 50.) "began to repent himself, although too late, for that he had granted licence to so many of his subjects to build castles within their own grounds."

An art, Dr. Henry observes, (History of Britain, vol. vi. p. 188 8vo.) so much practised as architecture was in this period, must have been much improved. That it really was so, will appear from the following very brief description of the most common form and structure of a royal castle, or of that of a great earl, baron, or prelate in this period; and as these castles served both for residence and defence, this description will serve both for an account of the domestic and military architecture of those times, which cannot well be separated.

The situation of the castles of the Anglo-Norman kings

and barons was most commonly on an eminence, and near a river; a situation on several accounts eligible. The whole site of the castle (which was frequently of great extent and irregular figure) was surrounded by a deep and broad ditch, sometimes filled with water, and sometimes dry, called the *fosse*. Before the great gate was an outwork, called a *barbacan*, or *antemural*, which was a strong and high wall, with turrets upon it, designed for the defence of the gate and drawbridge. On the inside of the ditch stood the wall of the castle, about eight or ten feet thick, and between twenty and thirty feet high, with a parapet, and a kind of embrasures, called *crennels*, on the top. On this wall at proper distances, square towers of two or three stories high were built, which served for lodging some of the principal officers of the proprietor of the castle, and for other purposes; and on the inside were erected lodgings for the common servants or retainers, granaries, store-houses, and other necessary offices. On the top of this wall, and on the flat roofs of these buildings, stood the defenders of the castle, when it was besieged, and from thence discharged arrows, darts, and stones, on the besiegers. The great gate of the castle stood in the course of this wall, and was strongly fortified with a tower on each side, and rooms over the passage, which was closed with thick folding-doors of oak, often plated with iron, and with an iron portcullis or grate let down from above. Within this outward wall was a large open space or court, called, in the largest and most perfect castles, the *outer bayle*, or *ballium*, in which stood commonly a church or chapel. On the inside of this outer bayle was another ditch, wall, gate, and towers, inclosing the inner bayle or court, within which the chief tower or *keep* was built. This was a very large square fabric, four or five stories high, having small windows in prodigious thick walls, which rendered the apartments within it dark and gloomy. This great tower was the palace of the prince, prelate or baron, to whom the castle belonged, and the residence of the constable or governor. Under ground were dismal dark vaults, for the confinement of prisoners, which made it sometimes be called the *dungeon*. In this building also was the great hall, in which the owner displayed his hospitality, by entertaining his numerous friends and followers. At one end of the great halls of castles, palaces and monasteries, there was a place raised a little above the rest of the floor called the *deis*, where the chief table stood, at which persons of the highest rank dined. Though there were unquestionably great variations in the structure of castles and palaces in this period, yet the most perfect and magnificent of them seem to have been constructed on the above plan. Such, to give one example, was the famous castle of Bedford, as appears from the following account of the manner in which it was taken by Henry III., A. D. 1224, from Matthew Paris. (Hist. Angl. p. 221, 222.) The castle was taken by four assaults. "In the first, was taken the barbacan; in the second, the outer ballia; at the third attack, the wall by the old tower was thrown down by the miners, where, with great danger, they possessed themselves of the inner ballia, through a chink; at the fourth assault, the miners set fire to the tower, so that the smoke burst out, and the tower itself was cloven to that degree, as to shew visibly some broad chinks; whereupon the enemy surrendered."

As Britain abounded in this period in fortified towns and castles, much of the art of war of course consisted in defending and assaulting strong places. For the various kinds of engines which were used both in the attack and the defence of these, we shall refer the reader to ARTILLERY; observing only that a knowledge of the application of them in this period may be obtained from the relation of the siege of Exeter

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Exeter castle by king Stephen in the year 1136. (See the *Gesta Regis Stephani* apud Duchesn, p. 934.) It is perhaps the most consummate specimen of the military skill of that age with which we are acquainted. And it may be enough to observe, that after this siege had lasted three months, and king Stephen had expended upon it in machines, arms, and other things, no less than 15,000 marks, equal in efficacy to 150,000 pounds of our money, the besieged were obliged to surrender for want of water. (*Henry's Hist. of Britain*, vol. vi. p. 217.)

Berkeley, which was originally founded in the reign of Stephen, is one of the best remains we are now possessed of, of an ancient feudal castle. But the changes which almost all these buildings have undergone in subsequent times may be judged of by those which have taken place at Berkeley. The buildings within the inmost only of the three gates are said to have been the work of Henry II. when duke of Normandy; while the two outermost, with all the buildings belonging to them, except the keep, are referred to the latter end of the reign of Henry II. and to those of the second and third Edwards. The hall and the two chapels are of the latter period; and the great kitchen, adjoining to the keep, was of the work of Henry VII.

Among the castles which Mr. King has endeavoured to appropriate to the early Norman period, are those of Nottingham, Lincoln, and Clifford's tower at York, all erected by the Conqueror. (*Archæol.* vol. vi. p. 257.) The remains of all these, he observes, fully illustrate the Norman mode of constructing such edifices. Tick-hill, in the neighbourhood of Doncaster, appears to have been another of these castles (*ibid.* 267.); and Pontefract bespeaks a Norman design, with rude and imperfect alterations. All of these appear to have been erected upon artificial mounts, and nearly cover the whole area of the summit of the respective hills on which they are situated.

Tunbridge castle, in Kent, built by Richard de Clare about the time of William Rufus, is mentioned by Mr. King as a specimen of the later Norman structures; and he has been very accurate in his description of it. (*Ibid.* 270.) Gundulph, who directed the building of the Tower of London in 1078, and the castle at Rochester, he describes to have introduced a great many judicious alterations, and not only to have increased the security but the magnificence of our military piles; and observes that the castle at Rochester is a complete specimen of all that he effected. Newark, which Mr. King afterwards mentions, is an instance of a prelate's castle in the reign of Stephen: and the keep of Knaresborough, of the time of Henry III., completes the specimens it may be proper to mention of the irregular style of castle building which prevailed during the interval between the Norman conquest and the middle of the thirteenth century.

To these succeeded the magnificent piles of Edward I. more convenient and more stately, and containing not only many towers, but great halls, and sometimes even religious houses. The best style of military architecture in this period was displayed in the castles of Caernarvon, Conway, and Caerphilly; and it is singular to observe that many of our more ancient castles were then increased with additions in the same sumptuous style.

After the age of Edward I. we find another kind of castle introduced, approaching nearer to the idea of modern palaces. The first of these was that at Windsor, built by Edward III. who employed William of Wykeham as his architect. This convenient and enlarged style of building was soon imitated, on a lesser scale, by the nobles of the realm; and two remarkable instances, wherein convenience

and magnificence were singularly blended at this period, may be found in the castles of Harewood and Spofford in Yorkshire. The improvements at Kenilworth afford another instance of the great enlargement which our castles during this age were accustomed to receive: and Naworth in Cumberland is another of the best specimens that can probably be referred to. Caistor in Norfolk affords the style of Henry Vith's reign. It was built by sir John Fastolf, who died in 1459.

To these venerable piles succeeded the castellated houses; mansions adorned with turrets, and battlements; but utterly incapable of defence, except against a rude mob, armed with clubs and staves, on whom the gates might be shut; yet still mansions almost quite devoid of all real elegance, or comfortable convenience, and fitted only to entertain a *herd of retainers* wallowing in licentiousness. At the same time, however, they discover marks of economy and good management, which enabled their hospitable lords to support such rude revels, and to keep up their state, even better than many of their more refined successors. Of these buildings one of the most perfect and most curious, now remaining, is Haddon house in Derbyshire; castellated and embattled, in all the apparent forms of regular defence; but really without the least means of resistance in its original construction. The description Mr. King has given of it (*Archæol.* vi. 347.) is, however, too long to be extracted, and too curious to be abridged.

After this kind of building, the magnificent quadrangular houses of the reign of Henry VIII. succeeded; of which the most beautiful and genuine models perhaps were those of Cowdray in Sussex, and Penshurst the seat of the Sidney family, in Kent.

Without referring to the stately buildings of Elizabeth's reign, it may be enough to say that here ends the history of the English castle. The block houses of Calshot, Hurst, Sandown, Sandgate, and South Sea, are the last instances of such buildings ever intended for a stand, and seem strongly to mark the revolution which has taken place in our defensive system of war.

The total change in military tactics brought about by the invention of gunpowder and artillery, the more settled state of the nation, Scotland becoming part of the dominions of the kings of England, the respectable footing of our navy, whose wooden walls secure us from invasions, and the abolition of the feudal system, all conspired to render castles of little use or consequence, as fortresses: so the great improvements in arts and sciences, and their constant attendant, the increase of luxury, made our nobility and gentry build themselves more pleasant and airy dwellings; relinquishing the ancient dreary mansions of their forefathers, where the enjoyment of light and air was sacrificed to the consideration of strength; and whose best rooms, according to our modern, refined notions, have more the appearance of goals and dungeons for prisoners, than apartments for the reception of a rich and powerful baron.

However, in the reign of Charles I., a little before the breaking out of the civil war, some inquiry into the state of these buildings seems to have taken place; for on the 22d of January, 1636, a commission was issued, appointing lieutenant colonel Francis Coningsby, commissary general of and for all the castles and fortifications in England and Wales, with an allowance of 13s. 4d. a day to be paid out of the cheques and defalcations that should be made by him from time to time; or, in default thereof, out of the Treasury. Whether this office was really instituted for the purpose of scrutinizing into the state of these fortresses, as foreseeing the events which afterwards happened; or whether it

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it was only formed to gratify some favourite, does not appear. During the troubles of that reign, some ancient castles were garrisoned and defended, several of which, particularly Corfe castle in Dorsetshire, were afterwards destroyed, by order of the parliament: since that period, they have been abandoned to the mercy of time, weather, and the more unsparing hands of avaricious men. The last have proved the most destructive; many of these monuments of ancient magnificence having been by them demolished for the sake of the materials: by which the country has been deprived of those remains of antiquity so essential, in the eyes of foreigners, to the dignity of a nation; and which, if rightly considered, tended to inspire the beholder with a love for the now happy establishment; by leading him to compare the present with those times when such buildings were erected:—times when this unhappy kingdom was distracted by intestine wars; when the son was aimed against the father, and brother slaughtered brother; when the lives, honour, and property of the wretched inhabitants depended on the nod of an arbitrary king, or were subject to the more tyrannical and capricious wills of lawless and foreign barons.

The few castles existing in the Saxon time, were, probably, on occasion of war, or invasions, garrisoned by the national militia, and at other times slightly guarded by the domestics of the princes or great personages who resided in them; but after the conquest, when all the estates were converted into baronies, held by knights service, Castle-guard, coming under that denomination, was among the duties to which particular tenants were liable. From these services the bishops and abbots, who till the time of the Normans had held their lands in frank almoign, or free alms, were, by this new regulation, not exempted; they were not indeed, like the laity, obliged to personal service, it being sufficient that they provided fit and able persons to officiate in their stead. This was, however, at first vigorously opposed by Anselm, archbishop of Canterbury; who, being obliged to find some knights to attend king William Rufus in his wars in Wales, complained of it as an innovation and infringement of the rights and immunities of the church.

It was no uncommon thing for the Conqueror, and the kings of those days, to grant estates to men of approved fidelity and valour, on condition that they should perform Castle-guard, with a certain number of men, for some specified time; and sometimes they were likewise bound by their tenures to keep in repair some tower or bulwark, as was the case at Dover castle.

In process of time these services were commuted for annual rents, sometimes styled ward-penny, and wayt-fee, but commonly castle-guard-rents; payable on fixed days, under prodigious penalties called *fur fizes*. At Rochester, if a man failed in the payment of his rent of castle-guard, on the feast of St. Andrew, his debt was doubled every tide, during the time for which the payment was delayed. These were afterwards restrained by an act of parliament made in the reign of king Henry VIII., and finally annihilated with the tenures by knights' service, in the time of Charles II. Such castles as were private property, were guarded either by mercenary foldiers, or the tenants of the lord or owner.

Castles which belonged to the crown, or fell to it either by forfeiture or escheat, (circumstances that frequently happened in the distracted reigns of the feudal times), were generally committed to the custody of some trusty person, who seems to have been indifferently styled governor or constable. Sometimes also they were put into the possession of the sheriff of the county, who often converted them into

prisons. That officer was then accountable to the exchequer, for the farm or produce of the lands belonging to the places entrusted to his care, as well as all other profits: he was likewise, in case of war or invasion, obliged to victual and furnish them with munition out of the issues of his county; to which he was directed by writ of privy seal. Variety of these writs, temp. Edw. III. may be seen in Madox's History of the exchequer; and it appears from the same authority, that the barons of the exchequer were sometimes appointed to survey these castles, and the state of the buildings and works carrying on therein. (See Grose's Preface to the Antiquities of England and Wales.)

CASTLE, in *Sea Language*, denotes an elevation on the deck of a vessel; or a part of the deck, fore and aft, raised above the rest.

CASTLE, *Fore*, *Castello di prora*, &c. See *FORE-castle*.

CASTLE, *Hind*, *Castello di poppa*. See *POOP*.

CASTLE-WARD, or CASTLE-GUARD, *Castelgardum*, or *Wardum Castri*, an imposition laid on such as dwell within a certain compass about any castle, towards the maintenance of those who watch and ward the *castle*, which see.

The word is sometimes also used for the circuit itself, inhabited by such as are subject to this service.

CASTLE, *Water*, a piece of hydraulic work finished with one or more fronts of building, with seeming windows and the like, containing a reservoir which gives play to cascades, &c. Or, a *water-castle* may be defined a receptacle of the public water furnished by an aqueduct, or otherwise, in which are inclosed the cocks of several water-pipes with a little basin; contrived to distribute and send it to different parts.

The *castella* of the ancient aqueducts are still visible at Rome, though half ruined. They are lined with a durable kind of cement, which, according to Pliny, surpasses in hardness the stones themselves. It is made of lime slacked in wine, and beaten up with hog's grease, and the juice of figs or pitch.

Modern writers on hydraulics treat of the laws of the efflux of water out of *castella* into pipes, canals, &c. Signior Poleni has a treatise express on castles, or reservoirs, whereby the waters of rivers are derived, the sides of which castles are made converging.

CASTLEBAR, in *Geography*, a market and post town of the county of Mayo, Ireland, which is also the shire town, and the most considerable in the county, having been much enlarged within a few years, in consequence of the judicious encouragement given by the proprietor, lord Lucan, to the linen manufacture and other trades. Agriculture also has improved in the neighbourhood. This town is situated on the river which runs from the lake of Castlebar, west of the town, to Lough Conn. In these and the other lakes of the neighbourhood, besides salmon and other fish, is found that kind of trout called the gillaroo, of which there is an account in the Philosophical Transactions, vol. lxiv. p. 116. 310. It is remarkable for a great thickness of stomach, which bears some resemblance to the gizzard of birds, and which is brought to table as a delicacy, under the name of gizzard. Mr. Pennant (*Brit. Zoology*, vol. iii.) does not think it a distinct species, but a variety occasioned by the nature of the waters, or of the food. Castlebar is a corporate town, which, before the union, sent two members to the house of commons, but has now lost that privilege. It has a barrack, and in the rebellion was a military station. When the French, under general Humbert landed at Killalla, in 1798, they surprized the troops at Castlebar, and taking possession of the town, held it for nine days, when

they directed their course towards Sligo. Distance from Dublin 114 miles west by north. N. lat. $53^{\circ} 50'$. W. long. $9^{\circ} 9'$. Statistical account of Mayo, &c.

CASTLE-BAY, or KISIMUL-BAY, a bay at the south end of the island of Barra. See *BARRA*.

CASTLE-BELLINGHAM, a small post town of the county of Louth, Ireland, on the north road, near the sea. It is well built, and pleasantly situated, and has a remarkably fine spreading elm, supposed to be the largest in the island. Here is an extensive brewery for ale and porter, the former of which has been for many years in high estimation. There are also a Danish fort on the sea coast near this town, and some other remains of antiquity in the neighbourhood, described in the *Louthiana*. Castle-Bellingham is 34 miles north from Dublin. N. lat. $53^{\circ} 53'$. W. long. $6^{\circ} 23'$.

CASTLE-BLAKENEY, a small post town of the county of Galway, Ireland, 80 Irish miles W. from Dublin. N. lat. $53^{\circ} 24'$. W. long. $8^{\circ} 22'$.

CASTLE-BLAYNEY, a post town of the county of Monaghan, Ireland, situated near Lough Barrac, a fine lake with many agreeable islands in it, on the borders of which is the seat of lord Blayney. Position N.W. from Dublin. N. lat. $54^{\circ} 6'$. W. long. $6^{\circ} 44'$.

CASTLE-CARY, anciently *CARI*, in *Geography*, a market town of Somersetshire, England, is situated three miles W. from Bruton, 12 S.E. from Wells, and 114 W. from London. The town consists principally of three streets, one of which is nearly a mile in length, but is thinly and irregularly built; the parish also embraces three contiguous hamlets; the houses of the whole amounted, in 1801, to 240, and the inhabitants to 1281. This town has a charter for holding a market on Tuesdays, but it has been long discontinued, except that markets for corn, sheep, and cattle, are occasionally held from All-hallow-tide to Easter. It has three annual fairs. The old market-house (erected in 1616), is now converted into dwelling houses. The church of Castle-Cary was anciently appropriated to the priory of Bath, and in 1292 was valued at twenty marks. A castle was erected here in the time of king Stephen, 1138, by William de Percheval, who, possessing this barony, exerted his power to harass that monarch. About this time Stephen was employed in besieging the city of Bristol, and Percheval availed himself of this event to distress his sovereign, by ravaging, from his castle at Cary, the adjacent country, and carrying away all provisions necessary for the support of the king's army. The king, finding Bristol impregnable, and conceiving it unsafe to continue longer before its fortrefs, raised the siege, and turned all his attention to the castle of Cary, from which he had been frequently annoyed. Here his arms were crowned with greater success; he battered the fortrefs with such rapidity and violence, that the garrison, reduced to the utmost extremity, receiving no reinforcement nor supplies from the earl of Anjou, or their allies in Bristol, surrendered at length upon terms of peace and allegiance. Subsequent to this, in 1153, we find Percheval again in arms in the same cause, when he defended this castle against Henry de Tracey, a firm adherent to the royal interest, who closely besieged him here, but was obliged to fly before the earl of Gloucester, who with some difficulty dismantled Tracey's fortifications. (See the *English Chronicles*). The castle appears to be wholly obliterated, and its site only known by an intrenched area of about two acres, called the camp, in which implements of war and bolts of iron have frequently been dug up. The manor and principal property of the town, after passing through va-

rious hands, now belongs to sir Richard Colt Hoare, Bart. of Wilts. "*Collinson's History of Somersetshire*," vol. ii. 4to.

CASTLE-COMER, a post town of the county of Kilkenny, Ireland, remarkable for its mines of what is usually called Kilkenny coal. Boate in his *Natural History of Ireland*, published about 1650, gives an account of the first discovery, when speaking of the probability that if diligent search were made for them, good coal mines would be discovered. "Already," says he, "one coal mine hath been found out in Ireland a few years since by mere hazard, and without having been sought for. In an iron mine of Mr. Christopher Wandsworth, after that for a great while they had drawn iron out of it, and that by degrees they were gone deeper, at last in lieu of ore they met with sea-coal, so as ever since all the people dwelling in those parts have used it for their firing, finding it very cheap." Mr. Wandsworth, or more properly sir Christopher Wandesford, who was master of the rolls, and afterwards deputy to lord Strafford, as lord lieutenant of Ireland, purchased the tract in which the collieries are situated; and it was erected by Charles I. into the lordship of Castle-Comer, containing above 12,400 acres. By the marriage of the late lord Ormond with the heiress of the Wandesford family, this lordship now belongs to a younger branch of the house of Ormond. The profits of working have sometimes been six or seven thousand pounds, but from various circumstances they have decreased. The number of pits at work together in 1800 was 16, which is about the average number: for many years have elapsed since 24 were at work, and the smallest number that has been known is twelve. From a pit there is usually raised from 20 to 30 barrels a day of coal, independent of culm. If a navigation existed from Castle-comer to Kilkenny, and to the Dublin canal, the use of the coal would be more extensive, on account of its greater cheapness, the carriage at present making the price very high. Near Castle-Comer there are also iron mines, and good materials for earthen ware. The town has 211 houses, many of them good and slated, and in 1800, 50 of them paid hearth money, from which cabins are exempt. Part of the town was burned during the rebellion of 1798, and has been rebuilt in a handsome manner. It is well situated for many manufactures, and the countess of Ormond, who resides there, gives every encouragement to settlers. Many particulars respecting the mines, price of labour, &c. may be found in Mr. Tighe's valuable and interesting account of Kilkenny. For an analysis of the coal, &c. see *KILKENNY Coal*. Castle-Comer is 45 Irish miles S.W. from Dublin, and 10 N. from Kilkenny. N. lat. $52^{\circ} 47'$. W. long. $7^{\circ} 13'$.

CASTLE-CONNELL, a small town of the county of Limerick, Ireland, on the east side of the river Shannon, remarkable for a chalybeate spa, which causes it to be much frequented in the summer season. The houses are chiefly small detached dwellings, now become numerous; but there are many fine seats in the neighbourhood. The surrounding scenery is very beautiful, and induces the visitors to make frequent excursions, which cannot fail of contributing to the improvement of their health. The ruins of the castle, which belonged to the family of Bourk, or de Burgho, are near the spa. This castle was built soon after the arrival of the English, and was deemed very strong so late as 1690, when it was blown up by order of the prince of Hesse, who commanded at Limerick. Castle-Connell is 6 miles north from Limerick, and 89 S.W. from Dublin. Ferrar's *Limerick*, &c.

CASTLE-DERMOT, a fair and post town of the county of

of Kildare, Ireland. St. Diernit is said to have founded a priory here in A.D. 500, from which it got part of its name. During many centuries it was called Tristle-Dermot, for what reason is not known; but of later years it has been called Castle-Dermot, from a castle belonging to the Fitzgeralds, of which there is not a trace remaining. It was plundered by the Danes in the 9th century, taken and sacked by Edward Bruce in 1316, and taken by col. Reynolds for Cromwell in 1650. Since which times its walls have mouldered to decay; but though the gates have been destroyed, the names of two of them are still preserved. The town is situated on a flat, and surrounded with a fine level country for several miles. Of the ruins, the old church, in part of which service is still performed, with the round tower adjoining, and two crosses, are supposed to be of the 10th century. The round tower is used as a belfrey, which seems to countenance the opinion, that this was their original destination. The remains of a Franciscan abbey, founded by one of the Fitzgeralds about the year 1300, show it to have been magnificent; particularly one of its windows, two of the ailes, and some of the octagon pillars, which still preserve the outlines of ancient grandeur and elegance. A parliament is said to have been held here in 1377; certainly there was such an assembly under the earl of Kildare, lord deputy in August 1499, when a tax was laid on, and some regulations adopted, which however did not probably extend beyond the English pale. The present inn is generally understood to be a part of the building in which the parliament was held. The first charter school established in Ireland was in this town, A.D. 1734, for forty boys. See *CHARTER Schools*. The number of houses in 1793 was 163, of which 63 were of lime and stone, and the rest cabins. There is no manufacture, but some little business is occasioned by the great post road from Dublin to Cork passing through it. It is 34 Irish miles S.W. from Dublin. N. lat. $52^{\circ} 54'$. W. long. $6^{\circ} 52'$. Philof. Survey of South of Ireland, Antholog. Hibern. &c.

CASTLE-DURROW. See *DURROW*.

CASTLE-FINN, a small post town of the county of Donegal, situated on the river Finn, which is navigable for vessels of 14 tons from Derry to this place. It is $4\frac{1}{2}$ miles S.W. from Lifford, and 104 N.W. from Dublin. N. lat. $54^{\circ} 48'$. W. long. $7^{\circ} 27'$.

CASTLE-GUARD, a mount near Ardee, county of Louth, Ireland, which has been generally considered as a Danish fort. It is entirely artificial, and encompassed with a double ditch and vallum. It is now all planted with wood, and looks very romantic. The perpendicular height of the mount from the bed of its foundation is near 90 feet, and the depth of the main trench betwixt 30 and 40. The circumference at the top is not less than 140; and round the foundation upwards of 600 feet. There appear to have been, from foundations yet remaining, two concentric octagonal buildings upon the summit of it. One seems to have been a fort of tower or castle; the other a kind of breast-work, or gallery, by way of parapet or battlements. The use as well as origin of this, and similar mounts, has been disputed.

CASTLEHAVEN, JAMES TOUCHET, lord Audley, earl of, in *Biography*, a nobleman who lived in the reigns of Charles I. and II. He entered into the service of the confederated Catholics in Ireland, A. D. 1641, and had a command in their service, and afterwards under the king, till the reduction of Ireland by Cromwell. In 1681, and again with some little alteration in 1684, he published "Memoirs concerning the Wars of Ireland," which occasioned much controversy, and the first edition, together with lord Angle-

sey's remarks on it, was declared by the king in council to be a *scandalous libel* against the government. This book was intended to controvert many of the statements in sir J. Temple's History of the Irish Rebellion, and will of course be consulted by those who wish to collect from the jarring accounts of prejudiced writers a tolerably impartial account of the events which then distracted Ireland. Lord Castlehaven seems to have been much attached to a military life, and his memoirs contain many remarks on the art of war, made by him while serving under the prince of Condé. Bishop Nicholson's Historical Library.

CASTLEHAVEN, in *Geography*, a harbour on the S.W. coast of Ireland, in the county of Cork, which has given name to a small village, and to the adjoining parish. It was called by the Spaniards *Porto-Castello*, from a castle near the entrance, and by the Irish *Glen-Barahane*, i. e. glen of Barahane, on account of a deep rocky glen near the church which is dedicated to St. Barahane. The entrance of the harbour is about half a mile wide; it is very clean and safe for vessels, drawing no more than 10 feet water. A body of Spaniards which came to the assistance of the Irish, in 1601, landed here, and intrenched themselves on the east side of the bay, of which some vestiges may still be seen. Sir R. Levison, an English admiral, came here and destroyed most of their vessels, from which the eastern point of the harbour was called *Galleon point*, but his own vessels suffered so much from a battery on the shore, that he returned with difficulty to Kinfales. The village of Castlehaven is 164 miles S.W. from Dublin, and 38 S.W. from Cork. Smith's Cork, &c.

CASTLEHAVEN, *Stags of*, a cluster of rocks, two of them considerable, and all of them to be seen at high water, lying S.W. of the harbour of Castlehaven, in N. lat. $51^{\circ} 26'$, W. long. $9^{\circ} 7'$. M'Kenzie, &c.

CASTLE-HEAD, *Two*, a cape on the S.W. coast of Ireland, at the eastern extremity of Crookhaven. N. lat. $51^{\circ} 27'$. W. long. $9^{\circ} 32'$.

CASTLE-HEAD, *Three*, a cape on the S.W. coast of Ireland, at the southern extremity of Dunmann's bay, county of Cork. N. lat. $51^{\circ} 26'$. W. long. $9^{\circ} 44'$.

CASTLE-ISLAND, a small island near Crookhaven, on the S.W. coast of the county of Cork, Ireland. N. lat. $52^{\circ} 14'$. W. long. $9^{\circ} 19'$.

CASTLE-ISLAND, a small town of the county of Kerry, Ireland, formerly called *The castle of the island of Kerry*. The ruins of the castle, which was encompassed by the river Mang, still remain. The land about it is very good, ranking among the best in Kerry; but it has been very badly managed. The town has decayed much, in consequence, it is said, of a division of interest among the proprietors. It is 9 miles E. from Tralee, and 133 S.W. from Dublin. Smith's Kerry.

CASTLE-KNOCK, a barony of the county of Dublin, Ireland, north of the river Liffy, so called from a castle of that name, which was formerly a place of considerable strength, but was taken by Edward Bruce in 1316. There is much attention paid to husbandry in this district; and a very laudable association has been formed in it, called the *Castleknock Farmers' Society*, the object of which is to encourage and reward those labourers in agriculture, with their wives and children, who distinguish themselves by their industry and sobriety. This society was established in 1798, and has been found productive of much benefit. There is an account of it in the *Reports* both of the *English and Irish Societies for bettering the condition of the Poor*.

CASTLE-LYONS, formerly called *Castle Lehan*, a market town of the county of Cork, Ireland, pleasantly situated in a fertile country on a small river which joins the

Bride. It has a good market for poultry, and has large fairs. The inhabitants are about 1000, and the town seems capable of great improvement. The ruin of the castle, the residence of the earls of Barrymore, which was burned a few years ago, makes a conspicuous appearance at a great distance. Here are a neat church of modern structure, and the ruins of an abbey, the possessions of which being assigned to the first earl of Cork, were left by him "to his daughter Barrymore, to buy her gloves and pins." Castle Lyons is 111 miles S.W. from Dublin, and about 14 miles N.E. from Cork. Smith's Cork, &c.

CASTLEMAIN, a small town of the county of Kerry, Ireland, situated on the river *Main*, or *Mang*, which is deep enough for vessels of 50 tons or upwards. The castle here formerly guarded the pass over the river, which divided the earl of Desmond's possessions from those of MacCarthy, and was given up to queen Elizabeth by the last earl. Though now in ruins, a constable is still appointed to guard it, who has some land and privileges annexed to the office. The town is very poor, which is in some measure occasioned by the badness of the harbour. There is a bar across the mouth of the entrance, and a spit of sand on each side of the channel, and there are no land marks which a stranger can easily understand. It is represented as too large in most old maps, and has been erroneously spoken of as very safe. Near Castlemain there is a spa, which, according to Smith, contains sulphur and iron. It is $152\frac{1}{2}$ miles S.W. from Dublin. N. lat. $52^{\circ} 10'$. W. long. $9^{\circ} 35'$. Smith's Kerry, M'Kenzie, &c.

CASTLE-MARTYR, a market and post town of the county of Cork, Ireland, belonging to the earl of Shannon, who resides there, and has paid great attention to its improvement, and to that of the adjoining country. It is a neat, well built town, and well watered by a canal, or artificial river, which surrounds lord Shannon's demesne, as well as the town. Mr. Young mentions the combing business being carried on extensively in Castle-martyr, but this trade has since declined in every part of the country. There is a charter school for 40 boys, to the support of which lord Shannon has largely contributed. This town was made a borough in 1663, and continued to send two members to parliament till deprived of this privilege by the union. It is 17 miles E. from Cork, on the road to Youghel, and 123 miles S.W. from Dublin. N. lat. $51^{\circ} 55' 30''$. W. long. $8^{\circ} 3'$. Smith's Cork, Young, &c.

CASTLE-POLLARD, a market and post town of the county of Westmeath, Ireland, which is 46 miles N.W. from Dublin, and 11 miles N. from Mullingar.

CASTLEREA, a market and post town of the county of Roscommon, Ireland, which is 84 miles W. by N. from Dublin, and $13\frac{1}{2}$ from Roscommon.

CASTLEREAGH, a barony of the county of Down, Ireland, so called from a castle, the ruins of which are about two miles S.E. of Belfast bridge.

CASTLE-RISING, is an ancient, though at present a very inconsiderable borough-town of Norfolk, England. It was formerly a sea-port of some consequence, and from its strong castle obtained many privileges; but the sea has deserted the town, its haven is choked up with sand, and the castle is in ruins. The latter, with the town, is situated on an eminence. The castle was built by William d'Albini, earl of Arundel and Suffex, in the time of Henry I. Three of its towers were defended and maintained by the lords Hunstanton, Wotton, and Ridon; and to support their men, they had a power given them by a statute of Edward III. to take provision of the circumjacent villages, paying for it within 40 days. Castle-rising is 100 miles N. from London, and

is an ancient borough by prescription. The burgesses were formerly about fifty, but these are now reduced to two persons; who possess the privilege of sending two members to parliament, and each alternately assumes the mayoralty of the town. In the vicinity of Castle-rising is a large chace, which possesses the privileges of a forest. The church of this town is a large ancient pile, built in the conventual form, with an ornamented west front. The rector has the privilege of proving all wills made in the parish, and also retains some other privileges, resulting from the customs of the castle. The markets here are discontinued, and the town is reduced to 49 houses and 254 inhabitants. Blomefield's History of Norfolk.

CASTLETON, in *Antiquity*, a very ancient edifice in Derbyshire, seated on the summit of an almost inaccessible rock, impending at a great height over the mouth of one of the most horrid and awful caverns which nature ever formed. Mr. King, in the *Archæologia* (vol. vi.) has very particularly described this curious remnant of antiquity. This presents a large niche in the wall of one of the apartments, with a singular kind of canopy or ornament at the top, supposed to have been the "idol-cell," or little idolatrous chapel in Pagan times. This supposition seems to receive some support, with respect to Castleton, from certain small idols which were dug up a few years ago in the neighbourhood. See **CASTLE**.

CASTLETON, in *Geography*, a township and river of America, in Rutland county, and state of Vermont, 20 miles S.E. of Mount Independence, at Ticonderoga. Lake Bombazon is chiefly in this town, and transmits its waters into Castleton river; which, rising in Pittsford, passes through this town in a south-westerly course, and falls into Pultney river, in the town of Fairhaven, a little below col. Lyon's iron-works. Fort Warner stands in this town. The number of inhabitants is 805.

CASTLE-TOWN, the name of a town in the isle of Man, which belongs to Great Britain, and is provincially connected with the county of Cumberland. It is the residence of the principal officers of the government, and the seat of the Manks' parliament. The houses are situated on the opposite sides of a small creek, that opens into a rocky and dangerous bay; the difficulty of entering which injures, in a certain degree, the commerce of the town. The streets are spacious and regular, and the houses are mostly neat and uniform. In the centre of the town is Castle-Rushen, a solid and magnificent structure of free-stone, erected on a rock, and considered as the chief fortrefs in the island. According to the Manks' traditions, it was built in the year 960, by the Danish prince, Guttred, who lies obscurely buried within its walls. The figure of the castle is irregular, and by some writers said to bear a great resemblance to Elfsneur, in Denmark. The stone glacis which surrounds it is supposed to have been built by cardinal Wolsey. The stone-work of the keep and several interior portions of the building are nearly as entire as when first erected, but the other parts have been repaired, as the castle has been several times besieged. In the keep is a deep dungeon for prisoners, who must have been lowered into it by ropes, as there are no steps to descend by. In this town is a neat and elegant chapel, which was erected between the years 1698 and 1701, and paid for out of the ecclesiastical revenues. The first stone was laid, and the chapel consecrated, by the good bishop Wilton in 1698. Here is also a free-school, which was established by bishop Barrow, about 1666. The school-house was formerly a chapel dedicated to St. Mary, as early as the year 1230. The courts of chancery and common law are held in this town. Here are about 500 houses.

houses. Feltham's Tour through the Isle of Man, 8vo. 1798.

CASTLE-TOWN, a small town, or rather village, at the western extremity of the county of Cork, Ireland, sometimes called *Castle-Dermot*; it is opposite to the island of Beerhaven, and affords a scanty supply to vessels lying in that harbour. It is 186 miles S.W. from Dublin. N. lat. $51^{\circ} 37'$. W. long. $9^{\circ} 49'$.

CASTLE-TOWN, a township of America, in Richmond county, Staten island, New York, which contains 805 inhabitants, including 114 slaves. Of its inhabitants 114 are electors.

CASTLE-TOWN *Delvin*, a market and post town of the county of Westmeath, Ireland, the castle of which gave name to the surrounding barony. It is 35 miles N.W. from Dublin, and $10\frac{1}{2}$ miles from Mullingar.

CASTLE-TOWN *Roche*, a market and post-town of the county of Cork, Ireland, thus called from a castle that was formerly the seat of the lords Roche. It is on the river Awbeg, 115 miles S.W. from Dublin, and about 22 miles from Cork.

CASTLE-TOWNSEND, a small town of the county of Cork, Ireland, on the bay of Castle-haven. There is a good fishery off this bay, and in it are excellent oysters. It is 159 miles from Dublin, and 35 from Cork.

CASTLE-WELLAN, formerly Castle-Vellin, a market and post-town of the county of Down, Ireland, pleasantly situated on the side of a small lake of the same name. It is 65 miles N. from Dublin, and 9 W. from Downpatrick.

CASTOLA, in *Ancient Geography*, a town of Italy, in Etruria, which was taken by the consul Fabius.

CASTOLI *Campi*, a mountain of Asia Minor, in the Doride, according to Xenophon.

CASTOLOGOI, a people of Gaul, placed by Pliny in the vicinity of the Atrebatii.

CASTOLUS, a town of Lydia, in Asia Minor, belonging to the Dorians, called by the Lydians Castoli.

CASTOR, in *Astronomy*, a moiety of the constellation Gemini; called also Apollo.—Also, a star in this constellation, whose latitude for the year 1700, according to Hevelius, was $10^{\circ} 4' 23''$ N.; and its longitude $16^{\circ} 4' 14''$ of Cancer. It is also called *Rafalgenze*, *Apollo*, *Aphellan*, *Avel-lar*, and *Anelar*.

CASTOR, in *Commerce*. See BEAVER, and CASTOR in *Zoology*.

CASTOR, or *Caistor*, in *Geography*, is a small town of Lincolnshire, England; having a weekly market on Monday, and three fairs annually. This place is said to have been a Roman station; but the only memorials of its fortifications and military character are the traces of an encampment on an eminence, at a place called Castle-hill, near the town. Several springs issue from this eminence, and supply the inhabitants with excellent water. The parish church is a fine old edifice, supposed to have been built out of the ruins of the castle. The latter structure is called Thong-castle, and, according to some of our old chronicles, was built by Hengist the Saxon; but this is very improbable, as the most eminent historians have endeavoured to prove, and with every degree of probability, that Hengist never penetrated so far north into England. Among the singular tenures of this country may be noticed one which belongs to this town. A proprietor of an estate in this neighbourhood holds it upon the condition of sending an agent every Palm Sunday to the north porch of the church, where he is enjoined to crack or smack, what is here called, a horse-gad, (a whip) three times while the clergyman is reading the first lesson. He then proceeds into the church, passes the pulpit, and performs many other truly ridiculous tricks:—a proof

of the folly and superstition of the age when this ceremony was instituted. Caistor is 156 miles N. from London; and consists of 202 houses, with 861 inhabitants.

CASTOR's *River*, a river of Newfoundland island, which discharges itself in the harbour of St. John's. Its size is considerable for 15 miles from the sea.

CASTOR, *Castoreum*, in the *Materia Medica*. This substance, which may be called an animal gum resin, is the inguinal gland of the beaver, (erroneously supposed by the ancients to be the testicle,) which has long been in use in medicine, though now but rarely. See CASTOR in *Zoology*.

The castor is brought over in roundish but flattened lumps, covered with a tough membranous skin. Castor is a brittle, reddish-brown, friable substance, of a pungent, bitterish, unpleasant taste, and an intensely strong and peculiar smell, disagreeable to most organs.

By far the best castor comes from Russia, and is in rounder and harder masses, and its smell is stronger and more diffusive. The ordinary sort, which is in flattened masses, is imported from Canada, and other parts of North America.

The odorous and more active part of castor is taken up by alcohol, water alone dissolving chiefly the bitter extractive part; but the scent of castor is readily imparted to any liquor with which it is digested. Water distilled from castor becomes strongly impregnated with the flavour, but long keeping and heat dissipate it.

The only preparation of castor in common use is the simple tincture, made in the proportion of an ounce to a pint of the spirit. The dose is about a dram, and it is supposed to possess pretty strong nervine and anti-hysterical properties, and with this view is often combined with valerian, *asafœtida*, or tonics.

By the analysis of Bullion la Grange, it appears to consist of a mucilage, a bitter extract, a resin, and an essential oil, in which last the odorous principle seems chiefly to reside, and a flaky crystalline matter much resembling adipocire, or the similar matter contained in biliary calculi.

CASTOR *Oil*, *Oleum Ricini*. The seed of the *Palma Christi* (*Ricinus Communis*), is a whitish kernel enclosed in a brown acrid husk, which, taken entire, excites pretty violent vomiting and purging. These seeds contain a large quantity of a mild nearly insipid oil, of which from a third to a fourth of the weight may be extracted, and is the common castor oil of the shops. It is imported largely from the West Indies, where it forms one of the commonest domestic medicines for most occasions.

Genuine castor oil is very thick and viscid, of a light amber or straw colour, with scarcely any smell or taste. It becomes beautifully transparent by subsidence, and a quantity of mucilage falls slowly to the bottom of the vessel.

The oil is prepared in two different ways, either by simple expression, without previous preparation, or by decoction. For the latter method, the nuts are beaten in deep wooden mortars, and then thrown into iron boilers filled with water, and slowly brought to a boiling heat with constant stirring. The oil rises as a scum at the top, which is simply strained and bottled. According to Dr. Wright, (*Medical Journal* for 1787,) the oil thus prepared is much milder than that obtained by pressure, on account of the mucilaginous and acrid part which the compression forces out of the nut and mixes with the oil.

The very mildest and finest Jamaica oil is very limpid, and nearly colourless, and has scarcely more taste and smell than fine olive oil, and its effects are proportionably milder.

Castor oil is one of the most valuable of all the purgative medicines which we possess. In the dose of about half an ounce to three quarters for an adult, it usually operates by stool.

fool, speedily and mildly, with but little griping, though the measure of effect must be much determined by the purity and fineness of the oil, the strong-smelling and coarser kind often producing some uneasiness in the bowels. On account of its general mildness, it is the medicine most commonly selected for puerperal women; and those of very delicate habits, and children. Its virtues are also deservedly extolled in the feverish inflammatory and spasmodic affections of the bowels, in enteritis, colica pictonum, &c. The oil, when taken unmixed, always passes through, in part undecomposed, and may be seen in the fæces.

The exhibition of the oil is often attended with some difficulty, particularly as oil is so little used for culinary purposes, that most persons have an aversion to the sensation of any kind of oil clinging to the mouth and fauces. In general, if the mouth is previously well moistened with peppermint-water, or any other strong-tasted agreeable liquor, and the oil, floating unmixed in a cup of water, be swallowed quickly in large mouthfuls, it is not felt in the mouth, and all disgust is avoided. But when this cannot be well-managed, and the disgust to the unmixed oil is insuperable, it may be readily made into an emulsion with yolk of egg and sugar, and any aromatic, which completely covers all the slight nauseous taste which the raw oil leaves in the throat. In this way, however, the purgative power must be diminished, that is, all that depends on the mere oil, which is not inconsiderable, since an equal quantity of salad oil will prove, in some degree, purgative, apparently by its mere lubricating effect.

The very frequent use of this oil is rather of late date in this country; though it has been long known and resorted to in particular cases.

Where the oil is naturally unusually acrid, or has become so by long keeping, it has been proposed to agitate it with warm water, with a view of dissolving out part of the acrid mucilage; a method which will probably succeed to a certain degree.

CASTOR, the *Beaver*, in *Zoology*, a genus of quadrupeds which have the front teeth in the upper jaw truncated, and hollowed in a transverse angle; those in the lower jaw transverse at the tips; grinders four in each jaw: tail long, depressed, and scaly: clavicles perfect, or collar bones in the skeleton.

Two species only of this genus are at present known, *Castor Fiber*, the common beaver; and the Chili beaver, *Castor Huidobrius*, or as it is called by the natives of Chili, *Guillino*.

CASTOR Fiber has an ovate, flat, and naked tail, by which character it is immediately distinguished from the other species, the tail of which is long, of a lanceolate form, and hairy. The colour of this animal is susceptible of considerable variation in different climates: most commonly it is of a reddish or chestnut brown. In northern countries they are dusky, and even sometimes of an intense black; but these latter are rare. Others are grey, cream-coloured, or white; and instances have occurred, in which those of a light-colour have been spotted with brown or black. Those of Canada are chestnut, and among the Illinois, they are yellow, or olivaceous brown.

The beaver is a native of the northern parts of Europe, Asia, and North America, abounding most in cold regions, and becoming gradually less common towards the south. In America they are found from the 30th degree of north latitude to beyond the 60th. In ancient times the beaver was a more general inhabitant of Europe than it is at present, especially in France, Spain, Italy, Greece, and Egypt, where they are now scarcely ever observed, and in Britain they have been wholly extirpated for some centuries. That it was formerly

an indigenous inhabitant of this country is certain upon the credit of the most authentic records. The latest accounts we have of them is in Giraldus Cambrensis, who travelled through Wales in 1188: he gives a brief history of their manners; and adds, that in his time they were only found in the *Teivi* river. Several pools of water in the northern parts of the Cambrian principality still bear the name of *Llyn yr afanc*, the pool (or lake) of beavers. There are two, if not more, of the pools amidst the wilds of the Snowdonian mountains that bear this name to the present day; there is one in particular in the vale of Nant Francon near Beddke-lert, in Caernarvonshire, and another in the river Conway, a few miles above Llanrwst. These were evidently the haunts of beavers. It is however believed that the beaver was uncommon in Britain before the tenth century, for by the laws of Howel dda (*Leges Wallicae*) the price of the beaver's skin (*Croen Llofhydan*) was estimated at 120 pence: a great sum in those days.

Beavers, when full-grown, are nearly three feet in length from the tip of the nose to the insertion of the tail; the tail itself measures almost twelve inches long; and the weight of the whole animal is from fifty to sixty pounds. Of all quadrupeds the beaver is considered as possessing the greatest degree of natural sagacity in constructing its habitation, though in other respects it is believed inferior to many. If we consider this animal in a state of nature (says Buffon) or rather in his dispersed and solitary state, we shall find that his internal qualities are not superior to other animals; he has neither the genius of a dog, the sagacity of an elephant, nor the cunning of a fox, and he is rather remarkable for external singularities than for any apparent superiority of internal qualities. The beaver is the only animal that has a flat, oval tail, covered with scales, which serves as a rudder to direct his course in the water; the only one that has the hind-feet webbed, and the toes of his fore-feet separate, which he uses to convey food to his mouth; the only one which resembles a land animal in his fore-parts, and approaches the nature of an aquatic one in the posterior; in short, he forms the same shade between quadrupeds and fishes, as the bat forms between quadrupeds and birds. But these singularities would be rather defects than perfections, if the beaver did not derive from this conformation peculiar advantages adapted to its mode of life, which render it superior to all other animals.—It is generally allowed, says this writer, in another place, that the beaver, far from having a superiority over other animals, seems to be inferior to many of them in his merely individual qualities, and this fact he asserts he was able to confirm, by having had a young beaver, which was sent him from Canada alive, in his possession for more than a twelve-month. This animal is mild, peaceable, and familiar; it was rather inclined to be gloomy and melancholy, had no violent or vehement passions, its movements were slow; it made few efforts except to gain its liberty, which it frequently attempted by gnawing the gate of its prison, but without violence or precipitation. In other respects it seemed to be perfectly indifferent; forming no attachments, and being as little inclined to offend as please. He was inferior to the dog in the relative qualities which might make him approach to man: he appeared neither formed to serve, command, or even to associate with any species but his own: his talents were repressed by solitude, and it seemed only by society with his own kind, those talents could be brought into action. When alone he had little industry, few tricks, and not sufficient distrust to avoid the most obvious snares. Far from attacking any other animal, he had scarcely the art to defend himself, always preferring flight to combat; he resisted only when driven to an extremity, and then bit very hard

hard with his teeth. Such traits of the manners of this animal in a state of captivity are singular. We are not, however, satisfied that the observations of Buffon will apply to the beaver generally; in one respect he is evidently incorrect; we are assured by the best authors that the beaver may be easily tamed. M. Klein tells us he kept a beaver for several years, which followed him, or would go in quest of him as a dog would search for his master; Kalm speaks decidedly to the same effect; he observes, in his travels, that he has seen beavers that would go out to fish, and bring the prey home to their masters; nay, that they would even follow men and dogs, go with them into the water, jump into the water, and come up again with the fish; and M. Gmelin affirms that he saw a beaver in Siberia, which had been reared in the house, who would wander to a considerable distance, sometimes returning with a female whom he would suffer to depart alone after the season of love.

Authors have said that the beaver, being an aquatic animal, could not live solely on land; an opinion which Buffon endeavours to prove erroneous; he observes that the young beaver before mentioned when taken to the water was afraid of it, and refused to go in; when plunged into the basin there was a necessity to hold him there by force, though in a few minutes he became perfectly reconciled; afterwards, when left to his liberty, he would frequently return to it of himself, and even roll upon the dirt, or wet pavement. One day he escaped and descended by a stair-case into the subterraneous vaults in the royal garden, and swam a considerable time in the stagnant water at the bottom of them, yet no sooner did he perceive the light of the torches which were brought to search for him, than he returned, and suffered himself to be taken without the least resistance. He was familiar, but not fawning, and was sure to express his desire for something to eat from those he saw at table, which he signified by a small plaintive cry, and some gestures with his fore-paws: when he obtained a morsel he carried it off and concealed it, that he might eat it at his ease. He slept pretty often, and then laid on his belly. No food came amiss to him, meat excepted, which he refused either raw or dressed. It was remarkable that he gnawed every thing within his reach, insomuch that it had been found necessary to line with tin the barrel in which he had been brought from Canada.

The favourite resorts of the beaver are retired woody situations on the borders of lakes, rivers, and other fresh waters; yet they are sometimes found on the sea shores near the influx of great rivers, where the waters are less saline than in the open sea.

According to Buffon, the beavers begin to assemble in the month of June or July, for the purpose of uniting into society. They arrive in numbers from all parts, and soon form a troop of two or three hundred. The place of rendezvous is generally the situation fixed for their establishment, and always on the banks of some water. If the waters be flat, and never rise above their ordinary level, as in lakes, the beaver makes no banks or dam; but in rivers or brooks, where the waters are subject to considerable risings and fallings, they construct a bank, and by this artifice form a pond, or piece of water, which remains always at the same height. The bank traverses the river, from one side to the other, like a sluice, and it is often from eighty to a hundred feet long, by ten or twelve broad at the base. This pile, for animals of so small a size, appears to be enormous, and supposes an incredible labour; but the solidity with which the work is constructed is still more astonishing than its magnitude. The part of the river where they erect this bank is generally shallow. If they find on the margin a large tree,

which can be made to fall into the water, they begin with cutting it down, to form the principal part of their work. This tree is often thicker than the body of a man. By gnawing the foot of the tree with their four cutting teeth, they accomplish their purpose in a very short time, and always make the tree fall across the river. They next cut the branches from the trunk to make it lie level. These operations are performed by the whole community. Several beavers are employed in gnawing the foot of the tree, and others in lopping off the branches after it has fallen. Others at the same time traverse the banks of the river, and cut down smaller trees from the size of a man's leg to that of his thigh. These they dress and cut to a certain length to make stakes of them, and first drag them by land to the margin of the river, and then by water to the place where the building is carrying on. These piles they sink down, and interweave the branches with the larger stakes. This operation implies the vanquishing of many difficulties; for to dress these stakes, and to put them in a situation nearly perpendicular, some of the beavers must elevate with their teeth the thick ends against the margin of the river, or against the cross-tree, while others plunge to the bottom and dig holes with their fore feet to receive the points that they may stand on end. While some are labouring in this manner, others bring earth, which they plash with their fore feet, and transport it in such quantities, that they fill with it all the intervals between the piles. These piles consist of several rows of stakes, of equal height all placed opposite to each other, and extend from one bank of the river to the other. The stakes facing the under part of the river are placed perpendicularly; but the rest of the work slopes upwards to sustain the pressure of the fluid, so that the bank, which is ten or twelve feet wide at the base, is reduced to two or three at the top. It has therefore not only the necessary thickness and solidity, but the most advantageous form for supporting the weight of the water, for preventing its issue, and for repelling its efforts. Near the top or thinnest part of the bank they make two or three sloping holes to allow the surface water to escape, and these they enlarge or contract, according as the river rises or falls; and when any breaches are made in the bank by sudden or violent inundations they know how to repair them as soon as the water subsides.—It would be superfluous after this account of their public works, to give a detail of their particular operations, were it not necessary in a history of these animals to mention every fact, and were not the first great structure made with a view to render their smaller habitations more commodious. These cabins, or houses, are built upon piles near the margin of the pond, and have two openings, the one for going to the land, and the other for throwing themselves into the water. The form of the edifices is either oval or round, some of them larger and some less, varying from four or five, to eight or ten feet in diameter. Some of them consist of three or four stories, and their walls are about two feet thick, raised perpendicularly upon planks, or plain stakes, which serve both for foundations and floors to their houses. When they consist of but one story, the walls rise perpendicularly only a few feet, afterwards assume a curved form, and terminate in a dome, or vault, which serves them for a roof. They are built with amazing solidity, and neatly plastered both without and within. They are impenetrable to rain, and resist the most impetuous winds. The partitions are covered with a kind of stucco, as nicely plastered as if it had been executed by the hands of man. In the application of this mortar their tails serve for trowels, and their feet for plastering. They employ different materials, as wood, stone, and a kind of sandy earth,

which

C A S T O R.

which is not subject to dissolution in water. The wood they use is almost all the light and tender kinds, as alder, poplar, and willow, which grow generally on the banks of rivers, and are more easily barked, cut, and transported, than the heavier and more solid species of timber. When they once attack a tree, they never abandon it till they cut it down and carry it off. They always begin the operation of cutting at a foot or a foot and a half above the ground. They labour in a sitting posture; and besides the convenience of this situation, they enjoy the pleasure of gnawing perpetually the bark and wood, which are most agreeable to their taste; for they prefer fresh bark and tender wood to most of their ordinary aliment. Of these provisions they lay up ample stores, to support them during the winter; but they are not fond of dry wood, and make occasional excursions during the winter season for fresh provisions in the forests. It is in the water, or near their habitations, that they establish their magazines. Each cabin has its own magazine, proportioned to the number of its inhabitants, who have all a common right to the store, and never pillage their neighbours. Some villages are composed of 20 or 25 cabins, but such establishments are rare; and the common republic seldom exceeds 10 or 12 families, each of which has its own quarter of the village, its own magazine, and its separate habitation. They will not allow strangers to settle in their neighbourhood. The smallest cabins contain two, four, or six; and the largest eighteen, twenty, or it is said even sometimes thirty beavers. They are almost always equally paired, there being the same number of females as of males. Thus, on a moderate computation, the society is often composed of 150 or 200, which all at first laboured jointly in raising the great public building, and afterwards in select tribes or companies, in making particular habitations. In this society, however numerous, an universal peace is maintained. Their union is cemented by common labours; and it is rendered perpetual by mutual convenience, and the abundance of provisions which they amass and consume together. Moderate appetites, a simple taste, an aversion against blood and carnage, divest them of the idea of rapine and war. They enjoy every possible good. Friends to each other, if they have some foreign enemies, they know how to avoid them. When danger approaches, they acquaint one another by striking their tails on the surface of the water, the noise of which is heard at a great distance, and resounds through all the vaults of their habitations. Each takes his part; some plunge into the lake, others conceal themselves within their walls, which are so firmly constructed that no animal will attempt to burst through, or overturn them. These retreats are not only very safe, but neat and commodious. The floors are spread over with verdure; the branches of the box and fir serve them for carpets, upon which they permit not the slightest dirtiness. The window that faces the water answers for a balcony to receive the fresh air, and to bathe. During the greatest part of the day they sit on end, with their head and anterior parts of the body elevated, and their posterior parts immersed in the water. This window is made with caution, the aperture being sufficiently raised to prevent its being stopped up with the ice, which in the climates inhabited by the beaver is often two or three feet thick. When this happens, they slope the window, cut obliquely the stakes which support it, and thus open a communication with the unfrozen water. This element is so necessary, or rather so agreeable to them, that they can seldom dispense with it. They often swim a long way under the ice, and it is then that they are most easily taken, by attacking the cabin on one hand, and at the same time watching at the hole made at some distance, where they are obliged to repair for the purpose of respiration. The

continual habit of keeping their tail and posterior part in the water appears to have changed the nature of their flesh. That of their anterior parts, as far as the reins, has the taste and consistence of the flesh of land or air animals; but that of the tail and hinder parts has the odour and all other qualities of fish. The tail, which is a foot long, an inch thick, and five or six inches broad, is even an extremity or genuine portion of a fish attached to the body of a quadruped; it is entirely covered with scales, and with a skin perfectly similar to those of large fishes: they may be scraped off with a knife, and after falling, they leave an impression on the skin as is observable in fishes under similar circumstances.

The beavers assemble in the beginning of summer. They employ the months of July and August in the construction of their bank and cabins. In September they collect their provisions of bark and wood; and afterwards enjoy the fruits of their labour and foresight. At this season they couple, each, as it is affirmed, selecting its mate; and abiding with her by choice rather than indulging in a promiscuous intercourse with the rest of the females. Thus they pass the autumn and winter together, during which time they occasionally go out on excursions to bring in a supply of fresh bark, which they prefer to that, which, by remaining long in their magazine, has become dry or hard, or has been by accident moistened with water. The females are said to be pregnant for four months; they bring forth at the end of the winter, and generally produce two young, rarely three, or four, which last they seldom if ever exceed, and nature has provided the female with four teats for suckling its young. About the end of winter the females are left by the males, who retire to the country to enjoy the products of the spring. They may occasionally revisit their cabins, but never remain long in them. The females continue in their cabins, and are occupied in nursing, protecting, and rearing their young, which at the end of a few weeks, are in a condition to follow their dams. The females now in their turns make frequent excursions, and recruit their strength with air, and fresh bark, and other herbage. Thus they pass the remainder of the summer till autumn, when the whole society again assembles. But even during the summer, while thus dispersed, should their banks or cabins be overthrown by inundations, they suddenly collect their forces, and repair the breaches which have been made. They are much more attached to some places than others, and have been observed to return every autumn, after their works have been repeatedly demolished to repair them, till harassed by this persecution, and weakened by the loss of several of their troop, they have with one consent deserted it, and retired to some more secure and less frequented neighbourhood.

Winter is the season principally allotted for hunting the beaver, as it is only then their fur is in perfection; and when, after their dwellings are demolished, a number of them are taken, their society, it is said, is never restored, but those which escape become houseless wanderers. Their genius is overcome by apprehension, and they never more attempt to exert it, but conceal themselves in holes under ground, and reduced to the condition of other animals they lead a timid life, employing themselves only to satisfy their immediate wants, and they retain no longer those qualities which they so eminently possess in their social state. These are the unassociated beavers mentioned by authors, who live solitary, and instead of constructing cabins, or vaulted and plastered receptacles, only form holes for their dwellings in the banks of rivers. These are commonly termed terrier beavers, and their fur is considered as far less valuable than that of the
beavers

beavers which herd together in societies. All the European beavers are solitary: it is only in the vast and scarcely habitable tracts of the northern regions those animals can be sufficiently secure from the intrusion of man, to form the commodious habitations already mentioned.

Many writers, not content with ascribing to the beaver social manners, and evident talents for architecture, have attributed to them general ideas of policy and government. They have asserted that when their society is formed, they reduce travellers and strangers of their own species into slavery; that they employ them in carrying their clay and wood; that they treat in the same manner the idle who will not, and the old who cannot, work; that is, throw them upon their backs, and use them as so many vehicles to carry their materials: that they never assemble in an even number, in order that they may have in all their deliberations a casting vote; that each tribe has its chief; and that they have centinels established for the public security. Ælian, and others of the ancients have pretended further, that, when closely pursued by the huntsman, they would stop short, and tear off the secretory glands of castor to satisfy the cupidity of the hunter; and when thus mutilated would present themselves to obtain mercy. Such reports are absurd, and are completely exploded by modern observers.

The fur of the beaver is more beautiful and thick than that of the otter; it is composed of two sorts of hair; the one, short and bushy, soft as down, and impenetrable to the water, immediately covers the skin; the other, longer, bristly, and shining, but thinner, serves as an upper coat, and defends the former from filth and dust. The latter is of little value, it is only the first that is used in our manufactures. The use of its fur in the hat manufactories is sufficiently well known: attempts have been also made in France to weave the hair of beavers with the Segovian wool, but which in the event was found to form a cloth of no very excellent quality. The blackest furs are generally thickest, and consequently most esteemed; nor is the fur of the solitary beavers equal to that of those who live in society. These animals, like all other quadrupeds, shed their hair in summer; and therefore the furs of such as are taken in that season are of little value; they are called the stage-beavers, being those which the Indians kill on their stages or journeys, and are esteemed the worst skins. Beaver skins are also distinguished by the name of coat beaver, and parchment beaver, by traders; the first is that which is worn by the Indians as coverlets, and the other is so named because the lower side resembles parchment.

In hunting beavers, the savages most commonly either shoot them or take them in traps. In the first instance they always proceed against the wind, for the beavers are shy, quick in hearing, and of a keen scent. The beavers are generally taken by shooting while they are at work, or when on shore feeding on the poplar bark. If they hear any noise when at work, they immediately jump into the water, and continue there some time; and when they rise, it is at a distance from the place where they plunged in. The traps laid for them are nothing more than poplar sticks laid in a path near the water; which when the beaver begins to feed upon they cause a large log of wood to fall on their necks, which is put in motion by their moving the sticks, and of course requires an ingenious contrivance. The savages generally prefer the latter mode of capture, because it does not damage their skins. In the winter they take the beaver in another manner; they break the ice in two places at a distance from the cabins, the one behind the other; after which they take away the broken ice with a kind of racket, the better to observe where to place the stakes. To these

they fasten nets, which have large meshes, and are sometimes 18 or 20 yards in length. When these are fixed, they proceed to demolish the house, and turn in a dog, which terrifying the beaver, he dives into the water, where he is soon entangled in the net and taken.

The skins of the beaver form a prodigious article of commerce; many thousands are annually imported by the Hudson's bay company into England from North America, which is the principal though not the only source from which our beaver skins are obtained; Russia furnishes a vast number. But besides the fur, which is a valuable article, the beaver affords a substance of considerable utility in medicine, the drug *castoreum* or *castor*, which see. This substance is secreted in two large cellular glands situated near the genital organs and the anus. Each animal affords about two ounces of this substance, and it is common to both sexes. It is pretended by some that the beavers extract this liquid by pressing the bladders with the feet; that it gives them an appetite when disgusted with food, and that the savages to entrap them wet the snares with it. Others affirm, however, with greater probability, that the animal employs this oily substance to anoint its fur and render it more impervious to the water. The American savages are said to obtain an oil from the tail of the beaver, which they apply as a topical remedy for different complaints. The flesh is seldom eaten; though fat and delicate to appearance, it is extremely bitter and unpalatable. Beavers are said to couple when a twelve month old, and it has been hence inferred that the beaver does not commonly live to the age of 20 years as some writers affirm. The American beavers feed principally on the *magnolia glauca*, *fraxina americana*, and a variety of roots, among which they seem to prefer those of the *acorus calamus*, or *calamus aromaticus*; the poplar, aspen, and birch are the favourite food of the European beavers.

The reader desirous of obtaining a further history of the beaver may consult the following publications with advantage. Præside, *Disputatio de Castore vel Fibro*, &c. Johan. Christi. Frommann, 1686. Præside, *Dissertatio; Castor breviter delineatus*, &c. Laur. Normanno, Upf. 1687. Berättelse om Bäfverns natur, &c. Acad. Handling, Nils Gissler, 1756. *Historia naturalis Castoris et Moschi*, &c. J. G. Linck. Lipsiæ, 1786. *Anatomy of a female Beaver, and an account of Castor found in her*, vol. 38. Phil. Traut. *Physikalisch-anatomische bemerkungen über den biber*. C. Gottwaldt. Nürnberg. 1782. *Observations sur le Castor, suivies de l'analyse chimique du Castoreum*. Journ. de Physique, T. 40.

CASTOR huidobrius differs from the former in having the tail long, lanceolate, and hairy; the fore feet lobed and the hind feet palmated.

This is the guillino beaver of Pennant, and Chili beaver of later English writers. It is a singular animal, and appears to have been first described by Molina in his *Natural History of Chili*. This writer (to whom later authors seem principally indebted for their account of this animal) informs us that it inhabits the deepest parts of the lakes and rivers of Chili, that it feeds principally on fish, and crabs; and does not construct any regular habitation like the common beaver; nor does it afford any of the sebaceous matter called castor. The length is about three feet. The head is nearly square; the eyes small; the ears rounded and short, and the snout obtuse; in each jaw are two sharp and strong cutting teeth, and the grinders like those of the other species of beaver. The body is very broad, and covered like the beaver with two sorts of hair, the undermost of which is finer than that of the rabbit, and is in much esteem with the manufacturers, being wrought into a kind of cloth which has the softness

of velvet, and is also used in the manufacture of hats. The colour of this animal is cinereous above, and whitish on the belly. The toes of the fore feet are lobated, or bordered with a membrane, and the hind feet are webbed; the toes five in number on each foot. The tail is compressed, and is besides distinguished from that of the common beaver in being lanceolate and hairy, a character by which the species may be easily known. This is represented as a bold, and even fierce animal, and as having the power of remaining for a considerable length of time under water. The female produces from two to three young at a birth.

The Zibethicus, or musk-rat, is arranged by some as a species of castor; but as it appertains more clearly to the rat tribe, recent naturalists refer it to the genus *Mus*. See *Mus zibethicus*.

CASTOR and Pollux, in *Astronomy*. See *GEMINI*.

CASTOR and Pollux, in *Meteorology*, a fiery meteor, which at sea appears sometimes sticking to a part of the ship, in form of one, two, or even three or four fire-balls: when one is seen alone, it is more properly called *Helena*; two are denominated *Castor and Pollux*, and sometimes *Tyndaridæ*.

Castor and Pollux are called by the Spaniards, *San Elmo*; by the French, *St. Elme*, *St. Nicholas*, *St. Clare*, *St. Helena*; by the Italians, *Hermo*; by the Dutch, *Vree Vuuren*.

Castor and Pollux are commonly judged to portend a cessation of the storm, and a future calm; being rarely seen till the tempest is nigh spent. *Helena* alone portends ill, and indicates the severest part of the storm yet behind.

When the meteor sticks to the masts, yards, &c. they conclude, from the air's not having motion enough to dissipate this flame, that a profound calm is at hand; if it flutters about, it indicates a storm.

CASTOR and Pollux, in *Fabulous History*, were two brothers, the sons of Tyndarcus or Tyndarus, king of Sparta, by his wife Leda, and they had two sisters, the famous *Helena* and *Clytemnestra*, the wife and murderer of Agamemnon. According to the fable, Jupiter had an amour with Leda, in the form of a swan, and she brought forth two eggs, each containing twins. From that impregnated by Jupiter proceeded Pollux and Helena, who were both immortal: from the other *Castor and Clytemnestra*, who being begotten by Tyndarus, were both mortal. They were all, however, called by the name "*Tyndaridæ*." These two brothers entered into an inviolable friendship; they accompanied the other noble youths of Greece in the expedition to Colchis, and signalized themselves by their valour. The fable adds, that when *Castor* died, his brother *Pollux*, who was immortal, prayed to Jupiter that he might share his immortality with him; which being granted, they lived and died by turns, and being translated into the heavens, they formed the constellation *Gemini*. As they were distinguished by their courage, particularly in their contests with pirates, they received divine honours, and seamen paid them peculiar devotion. Accordingly, the vessel which carried Paul, (*Acts xxviii. 11.*) was called *Dioscuri*, or *Castor and Pollux*, because their images were either carved or painted on the prow. There was besides some other deity on the stern; and these were regarded as the patrons and tutelary gods of the vessel.

A martial dance, called the "*Pyrrhic*," or "*Castorian*" dance, was invented in honour of those deities, whom the Cephallenians placed among the *dii magni*, and offered to them white lambs. The Romans also rendered them particular honours, on account of the assistance they are said to have given them in an engagement against the Latins; in which,

appearing mounted on white horses, they turned the scale of victory in their favour, for which a temple was erected to them in the forum.

CASTOREA, in *Botany*. Plum. See *DURANTA Plumierii*.

CASTOREUM, in the *Materia Medica*. See *CASTOR*.

CASTORIA, in *Geography*, a lake of European Turkey, in the province of Macedonia, and also a town of the same name; 30 miles W. of Edeffa.—Also, a river of European Turkey, which empties itself into the lake to which it gives name, in Macedonia; and the name is afterwards changed into *Vistritza*.

CASTORUM LACUS, in *Ancient Geography*, *Castorum templum*, or *Castorum nemus*, a place of Italy, 12 miles from Cremona, according to Tacitus; called *Castoris lucus* by Orosius, where *Cecina*, Vitellius's general, was defeated by the troops of Otho.

CASTRA, the Latin term for a camp, has given name to a great number of places; some of the principal of which we shall mention: e. g. *Castra*, a town of India, on this side of the Ganges, placed by Ptolemy in the country of the Salaceniens.—A place or town of Norica, in the *Itin.* of Anton.—A town of Macedonia, marked in Anton. *Itin.* on the route from Otranto to Constantinople, in passing by Macedonia, between Scirtiana and Heraclea.—A place of Italy, N.E. of Tergeste.—*C. Alexandri*, a place of Africa, in Marmarica; and also a place of Egypt near Pelusium.—*C. Annibalis*, a port of Italy, in Magna Grecia, on the peninsula formed by the gulfs Scyllaceus and Tarentinus, according to Pliny.—*C. Cæcilia*, *Caceres*, a town of Spain, in Lusitania, S. of Rusticiana.—*C. Cornelia*, a place of Africa Propria, according to Pliny and Mela. It is called by Julius Cæsar and Ptolemy, *C. Corneliæ*; and is the place where Scipio Africanus first encamped when he landed in Africa. It occupied a tongue of land, called "*Gellah*," about 2 stadia broad, and was the most northern and rugged part of the promontory of Apollo, situate in Africa, N. of Carthage.—*C. Cyri*, the place where Cyrus encamped when he marched his army into Lydia, against Cræsus, mentioned by Quintus Curtius and Arrian.—*C. Dellia*, or *Lelia*, a place of Africa, near *C. Cornelia* and the river Bagradas, according to Mela.—*C. Dan*, a place of Palestine, between Zerah and Eshtaol, in the tribe of Dan, where the spirit of the Lord began to move Samson. Judges xiii. 25. Josh. xix. 41.—Also, another place of Palestine, in the tribe of Judah, behind Kirjath-Jearim. Judges xviii. 12.—*C. Exploratorum*, a place in the Isle of Albion, mentioned in the second route of Antonine's Itinerary. If *Blatum Bulgium*, (which see) was really at Middleby, as Horsley renders probable, every circumstance leads us to fix the *Castra Exploratorum* at Netherby, and the moat at a small distance from it; for at the former there was a famous Roman town, and at the other an exploratory camp. Both these places are at a proper distance from *Blatum Bulgium* on the one hand, and *Luguvallium* on the other, and situated on the military way which led from the one to the other.—*C. Felicia*, a place in the island of Sardinia.—*C. Galba*, an episcopal see of Africa, in Numidia.—*C. Gemina*, a town of Spain, in the district of Hispalis, according to Pliny; which was tributary to the Romans.—*C. Germanorum*, a place of Africa, in Mauritania Cæsariensis, according to Ptolemy; near a small isle E. of the promontory of Apollo.—*C. Hannibalis*, *Castello*, a place of Italy, in Brutium, at a small distance N.E. of Scylacium. See *C. Annibalis*.—*C. Herculis*, a town of Germany, occupied, according to Ammianus Marcellinus, by the Romans. It was one of the seven places on the Rhine, which Julian repaired; and was situated over-against the

the place where Drusus opened a canal for discharging the waters of the Rhine into the Issel.—*C. Julia*, a town of Spain, placed by Pliny in Lusitania.—*C. Lapidariorum*, a place of Egypt, in the Thebaide.—*C. Manuaria*, a town of Spain.—*C. Monorum*, a place of Asia, in Mesopotamia, W. of mount Singaræ.—*C. Nova*, a maritime place of Africa, in Mauritania Cæsariensis, marked in the Itinerary of Antonine on the route from Cala to Rufucurum, between Tafagora and Ballene.—*C. Posthumiana*, the camp of Posthumus, a place of Spain, in the vicinity of Ucubis, fortified and garrisoned by Cæsar.—*C. Prætoria*, a place of Rome, near the porta Viminalis. It was a kind of citadel, accord-

ing to Pliny, where Tiberius assembled the prætorian cohorts. It was enclosed by walls, ditches, and towers, and had a temple, an arsenal, baths, fountains, &c.—*C. Puero-rum*, a place of Africa, in Mauritania Cæsariensis, between the colony of Gilva and Portus Divinus.—*C. Regina*, a place in Rhætia.—*C. Seberianensis*, an episcopal see of Africa, in Mauritania Cæsariensis.—*C. Trajana*, a place in the vicinity of Ribnik, a small town on the banks of the Aluta, in Dacia.—*C. Tyriorum*, a particular place of Egypt, in the environs of Memphis, according to Herodotus.—*C. Vici*, an episcopal see in the patriarchate of Antioch, under the metropolis of Anazarbus.

END OF VOL. VI.

